United States
Department of
Agriculture

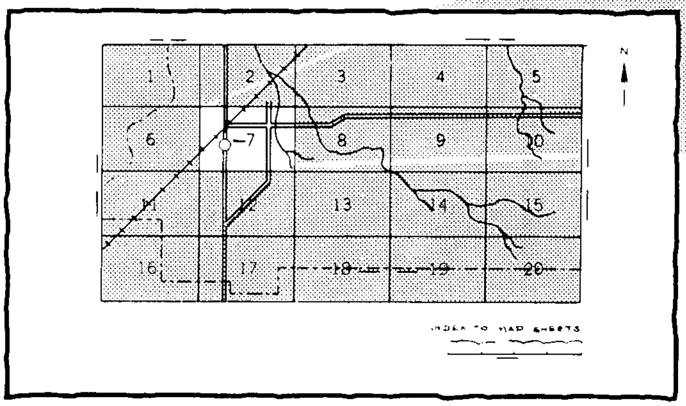
Soil
Conservation
Service

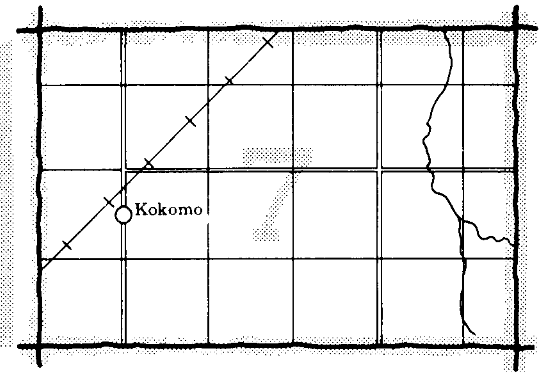
In Cooperation with
Montana Agricultural
Experiment Station

Soil Survey of Valley County, Montana

HOW TO USE

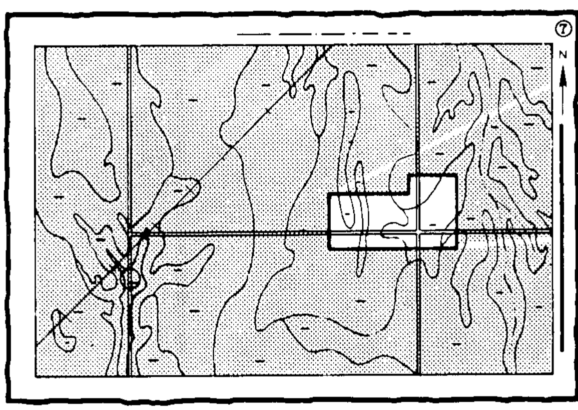
1. Locate your area of interest on the ''Index to Map Sheets'' (the last page of this publication).

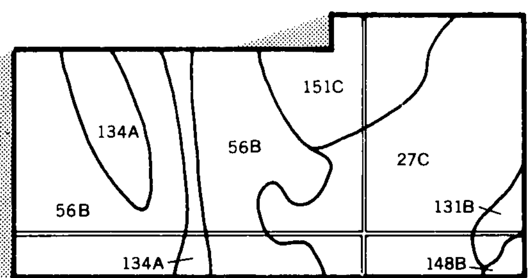




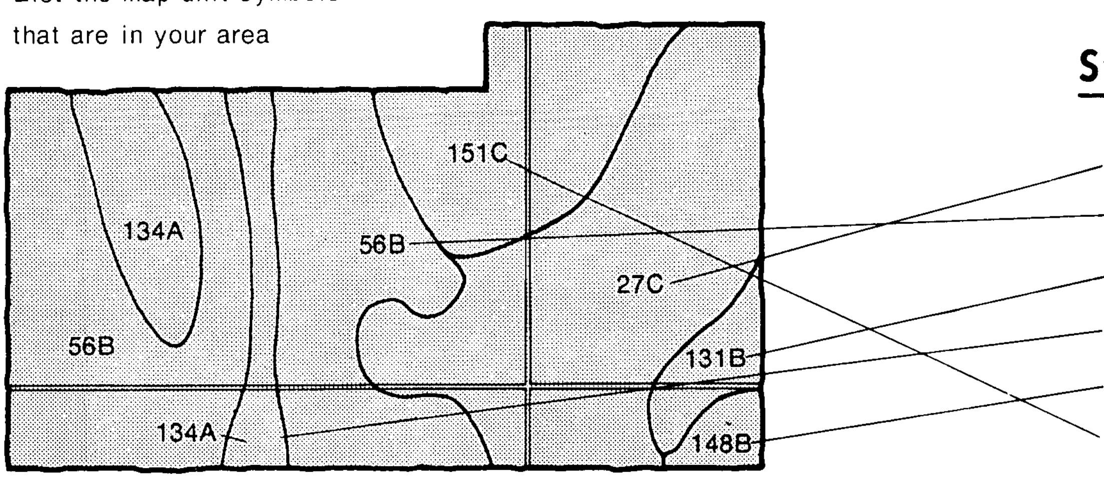
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area

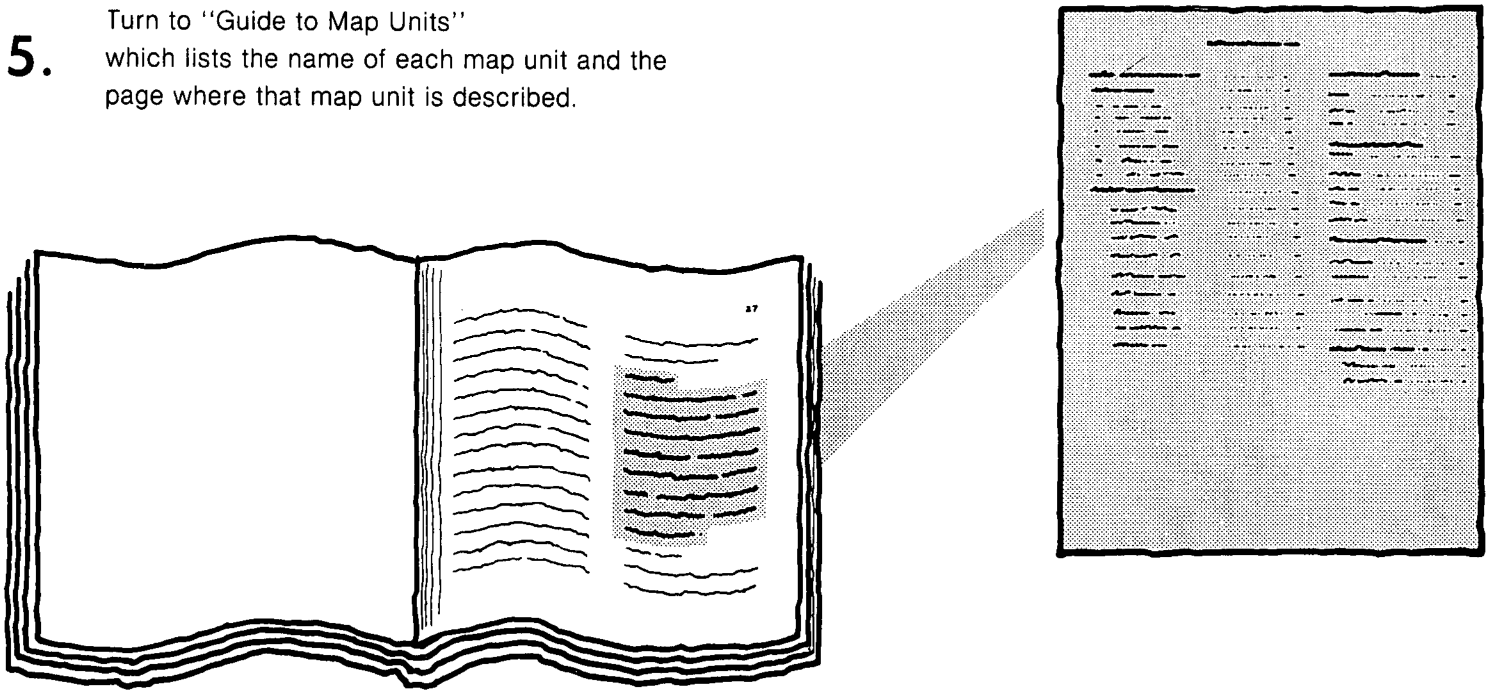


<u>**Symbols**</u>

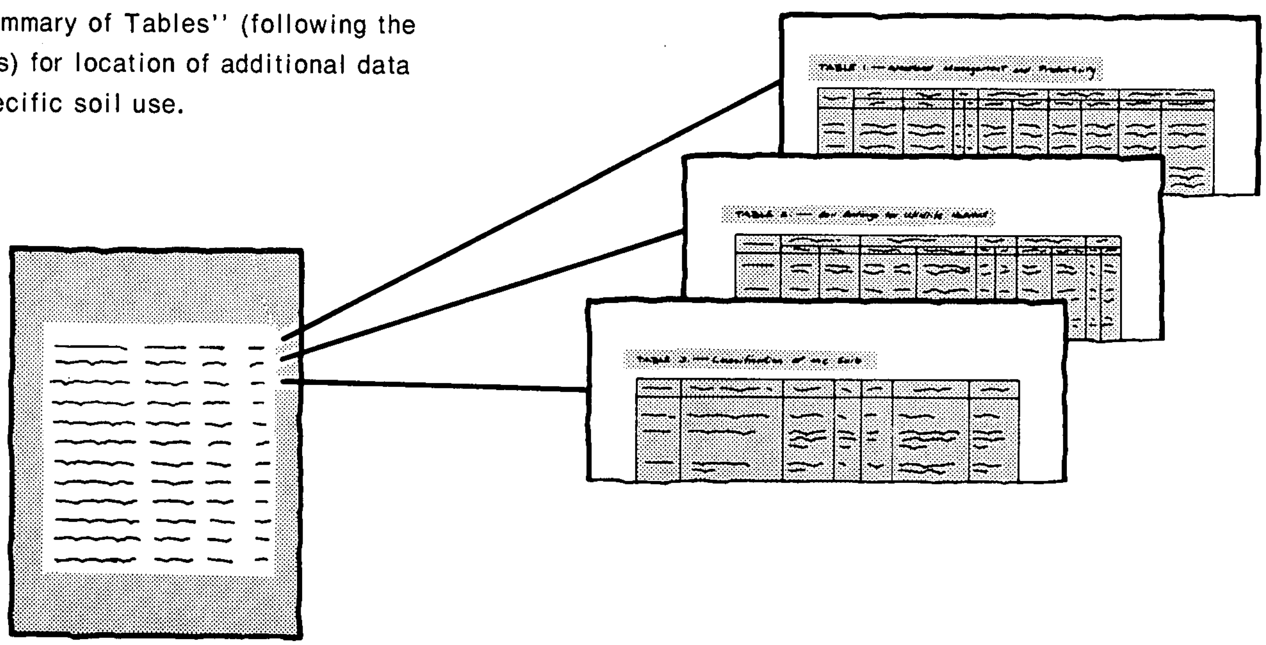
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Guide to Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1970–1975. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1975. This survey was made cooperatively by the Soil Conservation Service and the Montana Agricultural Experiment Station. It is part of the technical assistance furnished to the Valley County Conservation District.

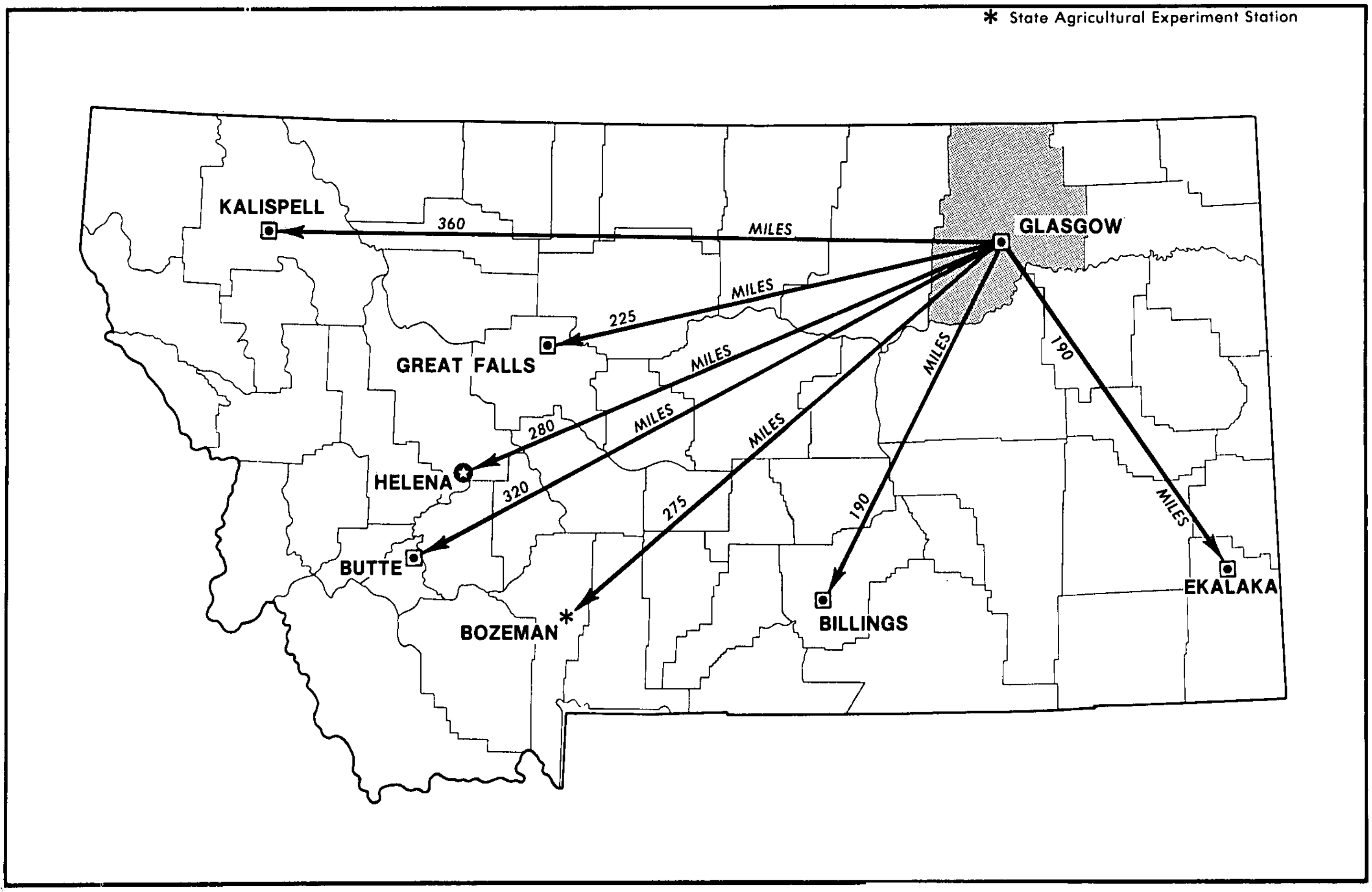
Financial assistance for the survey was provided by the United States Department of the Interior, Bureau of Land Management, Bureau of Indian Affairs, and Fish and Wildlife Service; the Montana Department of State Lands; and the Valley County Board of County Commissioners.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Contents

Issued September 1984

Summary of tables



Location of Valley County in Montana.

SOIL SURVEY OF VALLEY COUNTY, MONTANA

By LaMonte C. Bingham, Lewis A. Daniels, James H. Smith, and Michael J. Koehler,
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with Montana Agricultural Experiment Station

VALLEY COUNTY, in the northeast part of Montana (see opposite page), has a land area of about 3,175,040 acres, or 4,961 square miles. Glasgow, the county seat, is in the central part of the county.

About 25 percent of the county is used for crops, and the rest is used mainly for range. The principal crops are wheat, barley, oats, and hay. Beef cattle and small grain production are the main enterprises.

Elevation in the county ranges from about 2,000 to 3,300 feet. The mean annual precipitation is 10 to 14 inches, and the mean annual air temperature is 38 to 44 degrees. The frost-free season is mainly 110 to 130 days, except in the northeast part where it is 100 to 110 days.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in Valley County, where they are located, and how they can be used. The soil scientists went into the area knowing they probably would find many soils they had already observed in other areas and perhaps some they had never seen. They observed the steepness, length, and shape of slopes; the size of the streams; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. Mechanically operated soil probes were also used. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has not been changed much by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles that are almost alike make up a soil series. Except for differences in texture in the surface layer, all the soils of one series have major horizons that are similar in composition, thickness, and arrangement. A soil series is commonly named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Thoeny and Harlem, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, stoniness, or some other characteristic that affects use of the soil by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Harlem clay is one of several phases within the Harlem series.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the soils on aerial photographs. These photographs show buildings, field borders, trees, valleys, streams, and other details that helped to draw boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. On most maps that are detailed enough to be useful in planning and management of farms and fields, a map unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some map units are made up of soils of different series, or of different phases within one series. Three such kinds of map units are shown on the soil map of Valley County: soil complexes, soil associations, and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intricately associated or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Phillips-Elloam complex, 1 to 9 percent slopes, is an example.

A soil association is made up of adjacent soils that are in areas large enough to be shown individually on the soil map but are mapped as one unit, because the

time and effort of delineating them separately cannot be justified. A soil association has a considerable regularity in pattern and in the kinds of soil that are part of it. The extent of the soils can differ appreciably, from one delineation to another. The name of an association consists of the names of the dominant soils, joined by a hyphen. Farnuf-Tinsley-Reeder association, hilly, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are mapped as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. If two or more dominant series are represented in the group, the name of the groups ordinarily consists of the dominant soils, joined by "and." Turner and Farnuf loams, wet, 0 to 2 percent slopes, is an example.

Most survey areas include places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it was not classified in a soil series. These places are shown on the soil maps and are described in the survey, but they are called miscellaneous areas and are given descriptive names. Rock outcrop is an example.

While a soil survey is in progress, soil scientists take samples of the soils as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for on-site disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or to its high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil and they relate this failure to the high shrink-swell potential of the soil. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of range and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map is useful to people who want a general idea of the soils in an area, who want to compare different parts of an area, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed or wildlife area or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one map unit ordinarily differ in slope, depth, texture, drainage, and other characteristics that affect their management.

The map units in this survey have been grouped into four general kinds of landscapes for broad interpretative purposes. Each of the broad groups and their included map units are described in the following pages.

Areas dominated by nearly level and gently sloping, deep, well drained soils on the flood plains, fans, and low terraces

Two map units in Valley County are on flood plains, fans, and low terraces. The soils of these two map units formed in alluvial materials from clay shale, sandstone, and glacial till. The average annual precipitation ranges from 10 to 14 inches, and the frost-free season is 110 to 130 days. The soils are used mainly for irrigated and dryfarmed crops and for range. The native vegetation is mainly mid and short grasses. Cottonwoods, willows, wild roses, and snowberry grow in some areas near streams.

1. Harlem-Havre-Bowdoin

Nearly level soils formed in alluvium on flood plains and low terraces

This map unit is in the central part of the county along the Milk and Missouri Rivers. Small areas are also along some of the smaller streams in the county. Slopes are nearly level.

The map unit makes up about 5 percent of the county. It is about 40 percent Harlem soils, 30 percent Havre soils, 10 percent Bowdoin soils, and 20 percent soils of minor extent.

Typically the Harlem soils have a surface layer of gray clay about 6 inches thick. The underlying material is mainly light brownish gray and gray, stratified silty clay and silty clay loam.

The Havre soils have a surface layer of grayish brown silty clay loam about 5 inches thick. The underlying material is mostly light brownish gray stratified silty clay loam and loam.

The Bowdoin soils have a gray, clay surface layer

about 5 inches thick. The underlying material is gray and grayish brown clay.

Havre soils are mainly in areas near the stream channels and along the bends in the rivers. Harlem and Bowdoin soils mainly occupy the broad flood plains between uplands and stream channels.

The minor soils are the Lallie, Glendive, and Vaeda soils; Aquic Ustifluvents, saline; Ustic Torrifluvents, gently sloping; and Typic Fluvaquents, gently sloping. The poorly drained Lallie soils occupy oxbows and abandoned stream channels. Glendive soils are moderately coarse-textured and are near stream channels. Aquic Ustifluvents, saline, are moderately well drained and somewhat poorly drained, saline clays. Ustic Torrifluvents are well drained and moderately well drained. Aquic Ustifluvents, saline, and Ustic Torrifluvents are mainly along the small stream drainageways in the county. Typic Fluvaquents are poorly drained soils in oxbows, old stream channels, and wet areas along some streams. Vaeda soils are silty clays and have a crusty surface. They are in small areas along some streams.

Most of these soils are used for irrigated and dryfarmed crops. Some areas are used for range.

2. *Vaeda-Absher*

Nearly level and gently sloping soils formed in alluvium on fans and low terraces

This map unit is mainly in the southern part of the county along Willow, Larb, and Beaver Creeks and their tributaries. Slopes are nearly level and gently sloping.

This map unit makes up about 4 percent of the county. It is about 70 percent Vaeda soils, 25 percent Absher soils, and 5 percent soils of minor extent.

Typically the Vaeda soils have a surface layer of light brownish gray silty clay about 3 inches thick. The surface layer has a hard crust. The underlying material is mostly light brownish gray and gray silty clay. The soil material is hard or very hard when dry.

The Absher soils have a surface layer of light brownish gray loam about 2 inches thick. The subsoil, which extends to a depth of 14 inches, is grayish brown clay. The underlying material is light brownish gray clay loam. The subsoil and underlying material are moderately to strongly alkaline.

The minor soil is Ustic Torrifluvents. Ustic Torrifluvents are deep, loamy and clayey soils along intermittent stream channels.

Nearly all of this unit is used for range. Some small areas are used for dryfarmed crops.

Areas dominated by nearly level to hilly, shallow to deep, well drained soils on the shale and sandstone uplands

Three map units in Valley County are on the shale and sandstone uplands. The soils in these units formed mainly in material weathered from clay shale and soft sandstone. The average annual precipitation ranges from 10 to 14 inches, and the frost-free season is 100 to 130 days. The soils are used mainly for range. The native vegetation is mainly mid and short grasses. Some thin stands of juniper and ponderosa pine also grow in some areas.

3. *Lisam-Dilts-Rock outcrop*

Shallow, undulating to hilly soils formed in material weathered from shale, and rock outcrop, on uplands

This map unit is mainly in the southern part of the county. A minor part is in the northern part of the county. The landscape consists of hills and ridges on uplands that are dissected by streams. Slopes are undulating to hilly.

This map unit makes up about 19 percent of the county. It is about 30 percent Lisam soils; 20 percent Dilts soils; 15 percent Rock outcrop of shale; and 35 percent is soils of minor extent.

Lisam and Dilts soils are on hills, ridges, and side slopes. In both soils the surface layer and underlying material typically is gray clay. Clay shale is at a depth of about 12 inches. Lisam soils are mildly alkaline, and Dilts soils are very strongly acid.

Shale outcrop is on hills and ridges of the landscape. Areas of outcrop have very little vegetation.

The minor soils are of the Thebo, Vaeda, Absher, and Sunburst series. Thebo soils are undulating to strongly rolling and are moderately deep clay. They are on hills and foot slopes. Vaeda soils are silty clays and have a dense crust on the surface. They are along stream valley bottoms. Absher and Sunburst soils are deep clay loams. The Absher soils are on foot slopes and valley bottoms, and Sunburst soils are on hills.

All of this unit is used for range.

4. *Cabbart-Delpoint-Evanston*

Deep to shallow, gently sloping to hilly soils formed in material weathered from sandstone and in alluvium on uplands

This map unit is mainly in the southern part of the county. The landscape consists of hills, ridges, valleys, foot slopes, and fans on uplands. Slopes are gently sloping to hilly.

The map unit makes up about 6 percent of the county. It is about 35 percent Cabbart soils, 20 percent Delpoint soils, 20 percent Evanston soils, and 25 percent soils of minor extent and Rock outcrop.

Cabbart soils are gently rolling to hilly and are shallow. They are on hills, ridges, and valley side slopes. Rock crops out on the hills and ridges. Typically the surface layer is pale brown loam about 4 inches thick. The underlying material is light gray loam. Soft sandstone bedrock is at a depth of about 16 inches.

Delpoint soils are strongly rolling and hilly and are moderately deep. They are on hills, ridges, and valley side slopes. The surface layer is pale brown loam about 5 inches thick. The subsoil is pale brown loam, which extends to a depth of 22 inches. The underlying material is pale yellow loam. Soft sandstone bedrock is at a depth of about 32 inches.

Evanston soils are gently sloping to gently rolling and are deep. They are on fans, foot slopes, and upland plains. The surface layer is grayish brown loam about 5 inches thick. The subsoil is grayish brown clay loam and extends to a depth of 17 inches. The underlying material is mostly light brownish gray clay loam and loam. In some areas the soils have soft sandstone bedrock at a depth of 40 to 60 inches.

The minor soils are of the Marmarth, Phillips, El-

loam, and Marias series. They are on fans and uplands. Marmarth soils are loam and are moderately deep to sandstone. Phillips soils are deep loams. Elloam soils have a deep clay loam surface layer and a dense clay subsoil. Marias soils are deep clay.

This unit is used mainly for range. In some places the Evanston soils are used for dryfarmed crops.

5. *Reeder-Farnuf-Cambert*

Deep and moderately deep, nearly level to hilly soils formed in alluvium and material weathered from sandstone on uplands

This map unit is in the northeast part of the county. It consists of hills, ridges, foot slopes, and fans on uplands. Slopes are nearly level to hilly.

This map unit makes up about 6 percent of the county. It is about 30 percent Reeder soils, 20 percent Farnuf soils, 15 percent Cambert soils, and 35 percent soils of minor extent.

Reeder soils are undulating to strongly rolling and are moderately deep. They are on hills, ridges, and side slopes. Typically the surface layer is dark grayish brown loam about 3 inches thick. The subsoil, which extends to a depth of 12 inches, is brown clay loam in the upper part and pale brown loam in the lower part. The underlying material, to a depth of 26 inches, is very pale brown loam. Soft sandstone is below 26 inches.

Farnuf soils are nearly level to strongly sloping and are deep. They are on fans, terraces, and uplands. The surface layer is brown loam about 7 inches thick. The subsoil, which extends to a depth of 23 inches, is brown and grayish brown clay loam. The underlying material is grayish brown loam and light brownish gray clay loam.

Cambert soils are undulating to hilly and are moderately deep. They are on hills and ridges. The surface layer is yellowish brown silt loam about 4 inches thick. The subsoil, which extends to a depth of 16 inches, is yellowish brown and light yellowish brown silt loam. The underlying material is brownish yellow silt loam to a depth of about 28 inches. Soft sandstone and siltstone is below 28 inches.

The minor soils are Aquic Ustifluvents, saline, and the Doney, Tinsley, Turner, Phillips, and Elloam soils. Aquic Ustifluvents, saline, are somewhat poorly drained soils in bottom lands along intermittent streams. Doney soils are moderately deep loams on hills and ridges. Tinsley soils are deep and very gravelly. They are on hills and ridges. Turner, Phillips, and Elloam soils are deep loams and clay loams on fans and uplands. Turner soils have very gravelly underlying materials. Elloam soils have a dense clay subsoil. Small areas of Rock outcrop are on hills and ridges.

This map unit is used for range and dryfarmed crops.

Areas dominated by nearly level to hilly, shallow to deep, well drained soils on the glaciated plains and shale uplands

Four soil units in Valley County are on the glaciated plains and shale uplands. The soils formed in glacial till and material weathered from clay shale. The average annual precipitation ranges from 10 to 14 inches, and the frost-free season is 110 to 130 days. The soils are used for range and dryfarmed crops. The native vegetation is mainly mid and short grasses.

6. *Phillips-Scobey-Sunburst*

Deep, nearly level to hilly soils formed in glacial till on uplands

This map unit is in the central and northern part of the county and is mainly north of the Milk and Missouri Rivers. It consists of plains and hills on uplands. Slopes are nearly level to hilly.

This map unit makes up about 23 percent of the county. It is about 30 percent Phillips soils, 30 percent Scobey soils, 15 percent Sunburst soils, and 25 percent soils of minor extent.

Phillips soils are nearly level to gently rolling. They are on glaciated plains of uplands and are mainly in areas where slopes are concave to smooth. Typically the surface layer is pale brown and light brownish gray loam about 5 inches thick. The subsoil, which extends to a depth of 36 inches, is brown and light brownish gray clay loam and clay. The underlying material is light brownish gray clay loam.

Scobey soils are nearly level to strongly rolling. They are on glaciated uplands. Slopes are mainly convex and smooth. Typically the surface layer is grayish brown clay loam about 5 inches thick. The subsoil is 10 inches of brown and grayish brown clay loam. The underlying material is light brownish gray clay loam.

Sunburst soils are gently rolling to hilly. They are on hills and ridges. The surface layer is grayish brown clay loam about 4 inches thick. The underlying material is grayish brown and light brownish gray clay loam.

The minor soils in this unit are of the Elloam, Telstad, and Nishon series. They are all deep loams and clay loams. Nishon soils are in small basins where runoff is very slow or ponded. Elloam and Telstad soils are in small areas near Scobey and Phillips soils.

This map unit is used for dryfarmed crops and range.

7. *Phillips-Elloam-Thoeny*

Deep, nearly level to strongly sloping soils formed in glacial till on uplands

This map unit is mainly in the central and northern part of the county. It consists of plains and hills on uplands. Slopes are nearly level to strongly sloping.

The map unit makes up about 14 percent of the county. It is about 30 percent Phillips soils, 25 percent Elloam soils, 10 percent Thoeny soils, and 35 percent soils of minor extent.

Phillips soils are nearly level to gently rolling. Typically the surface layer is pale brown and light brownish gray loam about 5 inches thick. The subsoil, which extends to a depth of 36 inches, is brown and light brownish gray clay and clay loam. The underlying material is light brownish gray clay loam.

Elloam soils are nearly level to strongly sloping. The surface layer is light gray clay loam about 3 inches thick. The subsoil extends to a depth of 20 inches. The upper part of the subsoil is pale brown clay, and the lower part is light brownish gray clay loam. The underlying material is gray and light brownish gray clay loam.

Thoeny soils are nearly level and undulating. The

surface layer typically is pale brown loam about 6 inches thick. The subsoil extends to a depth of 19 inches. The upper part of the subsoil is brown clay, and the lower part is light brownish gray clay loam. The underlying material is light brownish gray and gray clay loam.

In most areas Phillips, Elloam, and Thoeny soils are intricately associated in the landscape, and may be only several feet apart.

The minor soils are of the Scobey, Sunburst, Nobe, and Nishon series. They are all deep clay loams, except for Nobe soils, which are saline clay. Sunburst soils are on hills and ridges. Nishon soils are in small basins where runoff is very slow or ponded. Scobey and Nobe soils occupy areas where slopes are nearly level to gently sloping.

This unit is used for range and dryfarmed crops.

8. *Telstad-Phillips*

Deep, nearly level to strongly rolling soils formed in glacial till on uplands

This map unit is mainly in the northeastern part of the county; however, some of it is on uplands south of the Milk River between Nashua and Fort Peck. It consists of glacial plains and hills on uplands. Slopes are nearly level to strongly rolling.

The map unit makes up about 3 percent of the county. It is about 70 percent Telstad soils, 20 percent Phillips soils, and about 10 percent soils of minor extent.

Telstad soils are nearly level to strongly rolling. They are on plains of glaciated uplands. Typically the surface layer is grayish brown loam about 8 inches thick. The subsoil extends to a depth of 34 inches. The upper part of the subsoil is brown clay loam, and the lower part is light brownish gray loam. The underlying material is light gray clay loam.

Phillips soils are nearly level to gently rolling. They are on glaciated plains of uplands and are mainly in areas where slopes are concave and smooth. The surface layer is pale brown and light brownish gray loam about 5 inches thick. The subsoil, which extends to a depth of 36 inches, is brown and light brownish gray clay and clay loam. The underlying material is light brownish gray clay loam.

The minor soils are of the Evanston, Lonna, and Nishon series. Evanston and Lonna soils are deep loams. They are mainly south of the Milk River. Nishon soils are deep loams that are in small basins where runoff is slow.

This unit is used mainly for dryfarmed crops.

9. *Elloam-Lisam-Sunburst*

Shallow to deep, nearly level to hilly soils formed in material weathered from clay shale and in glacial till on uplands

This map unit is mainly in the central and northern part of the county. It consists of hills and plains on uplands. It is mainly in the transition areas between shale uplands and glaciated plains. Slopes are nearly level to hilly.

This unit makes up about 10 percent of the county. It is about 20 percent Elloam soils, 20 percent Lisam soils, 20 percent Sunburst soils, and 40 percent soils of minor extent and shale outcrop.

Elloam soils are nearly level to strongly sloping and are deep. They are on fans, foot slopes, and glacial plains. Typically the surface layer is light gray clay loam about 3 inches thick. The subsoil extends to a depth of 20 inches. The upper part of the subsoil is pale brown clay, and the lower part is light brownish gray clay loam. The underlying material is gray and light brownish gray clay loam.

Lisam soils are undulating to hilly, and they are shallow. They are on hills, ridges, and side slopes. They occur mainly in areas where intermittent streams have dissected the uplands and have cut into the underlying clay shale. The surface layer and underlying material is typically gray clay. Clay shale is at a depth of about 12 inches.

Sunburst soils are gently rolling to hilly and are deep. They are on hills and ridges. The surface layer is grayish brown clay loam about 4 inches thick. The underlying material is grayish brown and light brownish gray clay loam.

The minor soils are of the Dilts, Thebo, and Phillips series. In places shale crops out. Thebo soils are moderately deep clays. Phillips soils are deep loams. Dilts soils are shallow, acid clays. Dilts and Thebo soils and shale outcrop are on side slopes of hills and ridges and are near the Lisam soils. Phillips soils are on foot slopes and plains and are near the Elloam soils.

This unit is used mainly for range.

Areas dominated by nearly level to strongly rolling, deep, well drained soils on alluvial fans and terraces and glaciated plains

Three map units in Valley County are on alluvial fans, terraces, and glaciated plains. The soils formed in alluvium and glacial till. The average annual precipitation ranges from 10 to 14 inches. The frost-free season is mainly 100 to 110 days. In map unit 12, the frost-free season is 110 to 130 days. The soils are used for dryfarmed crops and range. The native vegetation is mainly mid and short grasses.

10. *Williams-Farnuf-Martinsdale*

Nearly level to strongly rolling soils formed in glacial till and alluvium on uplands

This map unit is in the northeastern part of the county. It consists of glacial plains, fans, terraces, and alluvial plains on uplands. Slopes are nearly level to strongly rolling.

This map unit makes up about 6 percent of the county. It is about 30 percent Williams soils, 20 percent Farnuf soils, 20 percent Martinsdale soils, and 30 percent soils of minor extent.

Williams soils are undulating and gently rolling. They occupy the glaciated uplands. Typically the surface layer is a dark grayish brown loam about 7 inches thick. The subsoil, which extends to a depth of 25 inches, is brown and pale brown clay loam. The underlying material is pale brown loam and very pale brown clay loam.

Farnuf soils are nearly level to strongly sloping. They are on fans, terraces, and uplands. The surface layer

is brown loam about 7 inches thick. The subsoil, which extends to a depth of 23 inches, is brown and grayish brown clay loam. The underlying material is grayish brown loam and light brownish gray clay loam.

Martinsdale soils are nearly level to strongly rolling. They are on alluvial plains on uplands. The surface layer is dark grayish brown loam about 5 inches thick. The subsoil, which extends to a depth of 24 inches, is grayish brown and light brownish gray clay loam. The underlying material is light gray and pink loam that contains large amounts of carbonates.

The minor soils are of the Tally, Reeder, Cambert, Doney and Judith series. Tally soils are deep, sandy loams. Reeder and Doney soils are moderately deep loams. Cambert soils are moderately deep silt loams and Judith soils are deep loams. Tally soils are in small areas near Farnuf soils. Reeder, Doney, and Cambert soils are on hills and ridges and are moderately deep to sandstone. Judith and Martinsdale soils are in small areas on uplands. Also included are Aquic Ustifluvents, saline; Fluvaquentic Haploborolls, gently sloping; and Typic Fluvaquents, gently sloping, which are along narrow stream bottoms.

This unit is used for dryfarmed crops and range.

11. Tally-Dooley

Nearly level to strongly rolling soils formed in alluvium on uplands

This map unit is mainly in the northeastern part of the county. A small area is south of the Milk River. The unit consists of alluvial plains on uplands. Slopes are nearly level to strongly rolling.

This map unit makes up about 3 percent of the county. It is about 50 percent Tally soils, 15 percent Dooley soils, and 35 percent soils of minor extent.

Tally soils are nearly level to strongly rolling. Typically the surface layer is dark grayish brown sandy loam about 8 inches thick. The subsoil, which extends to a depth of 20 inches, is brown sandy loam. The underlying material is very pale brown loamy fine sand and light yellowish brown and light gray fine sand.

Dooley soils are nearly level to strongly rolling. The surface layer is dark grayish brown sandy loam about 7 inches thick. The subsoil, which extends to a depth of 17 inches, is brown sandy clay loam. The underlying material is grayish brown sandy loam to a depth of 26 inches and is light olive gray clay below.

The minor soils are the Parshall, Linden, Farnuf, Reeder, Cambert, and Doney soils. Parshall soils are deep sandy loams. They are mainly located south of the Milk River. Lihen soils are deep loamy sands and are in small, convex areas. Farnuf soils are deep loams and have smooth slopes. Reeder and Doney soils are loam and are moderately deep to sandstone. Cambert soils are moderately deep silt loams. Reeder, Doney, and Cambert soils are on hills and ridges.

This unit is used mostly for dryfarmed crops. Some areas are used for range.

12. Marias

Nearly level to gently rolling soils formed in alluvium on uplands

This map unit is near the Milk and Missouri River valleys. It is near the towns of Frazer and Beaverton and are southwest of Glasgow. Slopes are nearly level to gently rolling.

The map unit makes up about 1 percent of the county. About 95 percent is Marias soils, and 5 percent is soils of minor extent.

Marias soils are nearly level to gently rolling. Typically the surface layer is grayish brown clay about 6 inches thick. The underlying material is grayish brown and gray clay.

The minor soils are in the Lonna and Sunburst series. The Lonna soils are intermingled with the Marias soils on the landscape. Sunburst soils are on knolls and ridges, mainly near the edge of the map unit. Lonna soils are deep silt loams, and Sunburst soils are deep clay loams.

This unit is used mainly for dryfarmed crops.

Descriptions of the soils

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in Valley County. The map units and the series to which they belong are described in this section. The descriptions together with the soil maps can be useful in managing the soils for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils." See the "Guide to map units" for the page number of the management groupings, that is the capability unit, the range site, and the woodland suitability group, to which each map unit has been assigned.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

As mentioned in the section "How this survey was made," not all map units are members of a soil series. Badland and Rock outcrop, for example, do not belong to a soil series, but nevertheless are listed in alphabetic order along with the soil series.

Each soil series is described in detail, and then, briefly, each map unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the map units in that series. Thus, to get full information about any one map unit, it is necessary to read both the description of the map unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. Color terms are for dry soil unless otherwise stated. The profile described in the series is representative for map units in that series. If the profile of a given map unit is different from the one described for the series, these differences are stated in describing the

map unit, or they are differences that are apparent in the name of the map unit.

Preceding the name of each map unit is the symbol that identifies the map unit on the detailed soil map. Each map unit is described. Listed at the end of each description are the capability unit, range site, and windbreak suitability group in which the map unit has been placed.

The acreage and proportionate extent of each map unit are shown in Table 1. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the *Soil Survey Manual* (*3*).[1]

Absher series

The Absher series consists of deep, well drained soils that formed in alluvium. The soils are on fans and terraces. Slopes range from 0 to 5 percent. The native

[1] Italic numbers in parentheses refer to References, p. 97.

TABLE 1.—*Acreage and proportionate extent of the soils*

Soil	Acres	Percent
Absher-Vaeda complex, 1 to 5 percent slopes	39,270	1.2
Aquic Ustifluvents, saline	36,200	1.1
Attewan loam, 0 to 4 percent slopes	5,890	0.2
Badland	5,590	0.2
Bowdoin clay	5,030	0.2
Cabbart-Delpoint complex, 9 to 35 percent slopes	107,480	3.4
Elloam clay loam, 1 to 5 percent slopes	75,500	2.4
Elloam gravelly clay, 2 to 9 percent slopes	83,240	2.6
Elloam-Sunburst clay loams, 9 to 35 percent slopes	18,240	0.6
Evanston loam, 0 to 2 percent slopes	760	(1)
Evanston loam, 2 to 9 percent slopes	11,050	0.3
Evanston loam, sandstone substratum, 2 to 5 percent slopes	10,150	0.3
Evanston-Lonna loams, 2 to 9 percent slopes	24,810	0.8
Evanston-Marias complex, 3 to 9 percent slopes	3,030	0.1
Evanston-Marmarth loams, 3 to 12 percent slopes	26,430	0.8
Farnuf loam, 0 to 5 percent slopes	40,130	1.3
Farnuf loam, 5 to 9 percent slopes	6,160	0.2
Farnuf loam, gravelly substratum, 0 to 5 percent slopes	7,850	0.2
Farnuf-Reeder loams, 2 to 5 percent slopes	16,260	0.5
Farnuf-Tinsley-Reeder association, hilly	6,410	0.2
Fluvaquentic Haploborolls, gently sloping	5,590	0.2
Harlem silty clay loam	12,690	0.4
Harlem clay	56,080	1.7
Harlem clay, wet	1,900	0.1
Havre silty clay loam	32,800	1.0
Havre-Glendive complex	9,020	0.3
Havre-Harlem silty clays	13,590	0.4
Havre-Rivra complex	3,260	0.1
Hillon loam, 15 to 35 percent slopes	7,680	0.2
Hillon-Telstad loams, 9 to 15 percent slopes	10,260	0.3
Judith-Martinsdale loams, 5 to 15 percent slopes	4,910	0.2
Lallie silty clay	3,610	0.1
Lihen loamy fine sand, 2 to 9 percent slopes	1,190	(1)
Lisam-Dilts clays, 5 to 35 percent slopes	272,070	8.6
Lisam-Dilts-Rock outcrop complex, 9 to 35 percent slopes	142,020	4.5
Lonna silt loam, 1 to 3 percent slopes	1,760	0.1
Lonna-Marias complex, 1 to 3 percent slopes	2,280	0.1
Marias clay, 1 to 9 percent slopes	48,620	1.5
Marmarth-Cabbart loams, 5 to 25 percent slopes	47,870	1.5
Martinsdale loam, 1 to 5 percent slopes	48,860	1.5
Martinsdale-Judith loams, 1 to 5 percent slopes	5,080	0.2
Nishon loam	4,850	0.2
Nobe clay	6,050	0.2
Nobe-Absher complex, 0 to 3 percent slopes	8,090	0.3
Parshall sandy loam, 1 to 5 percent slopes	5,210	0.2
Phillips loam, 0 to 5 percent slopes	98,710	3.1
Phillips-Elloam complex, 1 to 9 percent slopes	179,840	5.7
Phillips-Nobe-Absher complex, 1 to 5 percent slopes	20,490	0.6
Phillips-Scobey complex, 2 to 9 percent slopes	283,180	8.9
Phillips-Telstad loams, 2 to 9 percent slopes	38,530	1.2
Phillips-Thoeny loams, 0 to 2 percent slopes	6,810	0.2
Redvale loam, 0 to 3 percent slopes	6,980	0.2
Reeder-Cambert-Doney complex, 2 to 9 percent slopes	62,940	2.0
Reeder-Doney-Cambert complex, 9 to 35 percent slopes	52,990	1.7
Rock outcrop	40,480	1.3
Savage clay loam, 0 to 3 percent slopes	2,580	0.1
Scobey clay loam, 1 to 9 percent slopes	127,890	4.0
Scobey stony clay loam, 2 to 15 percent slopes	4,250	0.1
Scobey-Sunburst clay loams, 5 to 25 percent slopes	79,060	2.5
Sunburst clay loam, 9 to 35 percent slopes	92,310	2.9
Sunburst-Lisam complex, 9 to 35 percent slopes	143,640	4.5
Tally sandy loam, 2 to 5 percent slopes	16,820	0.5
Tally-Dooley sandy loams, 0 to 5 percent slopes	39,860	1.3
Tally-Dooley sandy loams, 5 to 15 percent slopes	11,080	0.3
Telstad loam, 1 to 9 percent slopes	68,430	2.2
Thebo clay, 2 to 9 percent slopes	5,150	0.2
Thebo-Elloam clays, 2 to 9 percent slopes	7,740	0.2
Thebo-Lisam clays, 2 to 15 percent slopes	83,560	2.6
Thoeny-Phillips complex, 1 to 5 percent slopes	95,310	3.0
Tinsley complex, 9 to 35 percent slopes	30,250	1.0
Tinsley-Reeder-Doney complex, 9 to 35 percent slopes	22,110	0.7
Turner loam, 0 to 2 percent slopes	12,210	0.4
Turner and Farnuf loams, wet, 0 to 2 percent slopes	1,520	(1)
Typic Fluvaquents, gently sloping	8,520	0.3
Ustic Torrifluvents, gently sloping	88,080	2.8
Vaeda silty clay	82,110	2.6
Williams loam, 2 to 9 percent slopes	65,740	2.1
Water areas (more than 40 acres in size)	11,050	0.3
TOTAL	3,175,040	100.0

[1] Less than 0.05 percent

vegetation is mainly western wheatgrass, green needlegrass, Sandberg bluegrass, Nuttall saltbush, and some forbs and shrubs.

In a representative profile the surface layer is light brownish gray loam about 2 inches thick. The subsoil is 12 inches of grayish brown clay. The underlying material, to a depth of 60 inches or more, is light brownish gray clay loam.

Permeability is very slow, and the available water capacity is moderate or low. Reaction is moderately alkaline to a depth of about 14 inches and is moderately alkaline or strongly alkaline below.

These soils are mainly used for range and wildlife habitat.

Representative profile of Absher clay loam, from an area of Absher-Vaeda complex, 1 to 5 percent slopes, in native grass, 800 feet north and 700 feet east of the southwest corner of sec. 32, T. 25 N., R. 36 E.:

A2—0 to 2 inches, light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate very thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; plates coated with bleached silt and sand; moderately alkaline; abrupt smooth boundary.

B2t—2 to 9 inches, grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong medium columnar structure that parts to strong medium angular blocky; very hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; continuous moderately thick clay films on faces of peds; tops of columns coated with bleached silt and sand grains; moderately alkaline; clear smooth boundary.

B3tca—9 to 14 inches, grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure that parts to moderate medium angular blocky; hard, firm, sticky and plastic; common very fine roots; common fine tubular pores; few thin clay films on faces of peds; strongly effervescent; moderately alkaline; gradual smooth boundary.

C1ca—14 to 24 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure that parts to weak coarse angular blocky; hard, friable, sticky and plastic; common very fine roots; common fine tubular pores; common fine soft masses of lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

C2—24 to 45 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; few very fine roots; common fine soft masses of lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

C3—45 to 60 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; few very fine roots; few fine seams of salt; slightly effervescent; moderately alkaline.

The soil is noncalcareous to a depth of 5 to 10 inches. In native grass the A2 horizon is 1 to 4 inches thick. Where cultivated the Ap horizon is mainly clay loam. The B2t horizon is clay. Clay content ranges from 40 to 50 percent.

1—Absher-Vaeda complex, 1 to 5 percent slopes. This complex consists of nearly level and gently sloping soils on fans and terraces. About 50 percent is Absher clay loam and about 40 percent is Vaeda silty clay. The Absher soil in this complex has the profile described as representative of the Absher series. The individual soils are intermingled in small areas and occur in an unpredictable pattern on the landscape.

Included with this complex in mapping are small areas of Nobe and Phillips soils. Also included are some soils that are calcareous throughout. These inclusions make up 10 percent of the map unit.

Surface runoff is medium or rapid. The hazard of wind erosion is slight, and the hazard of water erosion is moderate.

Soils in this complex are suited to range and wildlife habitat. Capability units VIs–1, dryland; Dense Clay range site; Absher soil in windbreak suitability group 3S; Vaeda soil in windbreak suitability group 4.

Aquic Ustifluvents

2—Aquic Ustifluvents, saline. This map unit consists of deep, nearly level and gently sloping soils that formed in alluvium of flood plains, stream terraces, and fans in valleys. These soils are along intermittent and perennial streams. Slopes are 0 to 3 percent. The surface layer and underlying material are clay or clay loam that is mottled below a depth of 36 inches. The soils are moderately well drained and somewhat poorly drained. A water table is at a depth of 40 to 60 inches during most of the growing season. These soils are subject to common flooding.

Surface runoff is slow, and the hazard of wind and water erosion is slight. The soils are moderately to strongly saline.

These soils are suited to range and wildlife habitat. Capability unit VIw–1, dryland; Saline Lowland range site; windbreak suitability group 4.

Attewan series

The Attewan series consists of deep, well drained soils that formed in alluvium. The soils occupy fans and terraces on uplands. They are underlain by very gravelly loamy sand at a depth of about 24 inches. Slopes are 0 to 4 percent. The native vegetation is mainly western wheatgrass, green needlegrass, needleandthread, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, forbs, and shrubs.

In a representative profile the surface layer is brown loam about 4 inches thick. The subsoil is 10 inches of brown clay loam. The underlying material, to a depth of 24 inches, is light gray gravelly loam. Below that it is pale brown very gravelly loamy sand to a depth of 60 inches or more.

Permeability is moderate to a depth of about 24 inches and rapid or very rapid below. The available water capacity is low. Reaction is neutral and mildly alkaline to a depth of about 14 inches and moderately alkaline below.

These soils are mainly used for range, dryland crops, and wildlife habitat.

Representative profile of Attewan loam, 0 to 4 percent slopes, in native grass, north of road, 2,620 feet south and 2,300 feet west of the northeast corner of sec. 18, T. 30 N., R. 38 E.:

A1—0 to 4 inches, brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; neutral; clear smooth boundary.

B2t—4 to 14 inches, brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure; hard, friable, sticky and plastic; many very fine roots; many very fine tubular pores; continuous moderately thick clay films on faces of peds; 5 percent pebbles; mildly alkaline; clear smooth boundary.

C1ca—14 to 24 inches, light gray (10YR 7/2) gravelly loam, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; 30 percent pebbles; thick lime casts on lower sides; many soft masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

IIC2ca—24 to 60 inches, pale brown (10YR 6/3) very gravelly loamy sand, dark brown (10YR 4/3) moist; single grained; loose, slightly sticky; few very fine roots; 70 percent pebbles; thin lime coasts on lower sides; strongly effervescent; moderately alkaline.

Lime is at a depth of 10 to 18 inches. The B2t horizon is 30 to 35 percent clay. The C1ca horizon ranges from a gravelly loam to gravelly sandy loam that is 20 to 35 percent pebbles and cobblestones. The depth to the IIC horizon ranges from 20 to 30 inches. The IIC horizon is from 50 to 80 percent gravel.

3—Attewan loam, 0 to 4 percent slopes. This nearly level and gently sloping soil is on fans and terraces.

Included with this soil in mapping are areas that have a gravelly loam surface layer. Also included are a few small areas of soils that are gravelly loamy sand at depths of 15 to 20 inches and small areas of Redvale soils.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

This soil is suited to dryfarmed wheat, barley, and oats. It is also suited to wildlife habitat and range. Capability unit IIIs-3, dryland; Silty range site; windbreak suitability group 3M.

Badland

4—Badland. These miscellaneous areas consist of moderately steep and steep, nearly barren land on uplands broken by numerous deep, intermittent drainageways. Barren knolls and ridges of mostly sandstone and soft shale that have steep side slopes are dominant. Slopes are 25 to 60 percent. Included in mapping are saline areas in bottoms of narrow drainageways. Small, vegetated areas of Cabbart, Lisam, and Delpoint soils are on lower slopes and along bottoms.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

Badland is suited mainly to esthetic uses and wildlife habitat. Some very limited grazing of livestock occurs on the included soils on lower slopes and in narrow bottoms throughout the unit. Capability unit VIII.

Bowdoin series

The Bowdoin series consists of deep, well drained soils that formed in alluvium. The soils are on flood plains and low stream terraces. Slopes are 0 to 2 percent. The native vegetation is mainly western wheatgrass, green needlegrass, Sandberg bluegrass, Nuttall saltbush, and some forbs.

In a representative profile the surface layer is gray clay about 5 inches thick. The underlying material, to a depth of 60 inches or more, is gray and grayish brown clay.

Permeability is very slow. The available water capacity is moderate. Reaction is moderately alkaline.

These soils are used for range and irrigated hayland, pasture, wildlife habitat, and some irrigated small grain.

Representative profile of Bowdoin clay, in cultivated field, 1,100 feet south and 800 feet west of the northeast corner of sec. 22, T. 31 N., R. 35 E.:

Ap1—0 to 1 inch, gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; moderate fine and very fine subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots; many fine interstitial pores; moderately alkaline; clear smooth boundary.

Ap2—1 to 5 inches, gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; moderate coarse angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots; many fine interstitial pores; 1- to 2-inch wide vertical cracks that are 4 to 10 inches apart; moderately alkaline; clear smooth boundary.

C1—5 to 22 inches, gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; weak coarse angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots; many fine tubular pores; pressure faces on some ped surfaces; 1- to 2-inch wide vertical cracks that are 4 to 10 inches apart; moderately alkaline; gradual wavy boundary.

C2cs—22 to 40 inches, gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; weak coarse angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; many fine tubular pores; common nests of gypsum; moderately alkaline; gradual wavy boundary.

C3cs—40 to 60 inches, grayish brown (2.5Y 5/2)

clay, dark grayish brown (2.5Y 4/2) moist; common fine distinct mottles of dark gray (5Y 4/1) and dark brown (7.5YR 4/4) moist; massive; very hard, very firm, very sticky and very plastic; common nests of gypsum; moderately alkaline.

Between depths of 10 and 40 inches, clay content ranges from 60 to 80 percent. Below depths of 30 inches, some profiles are commonly stratified by coarser textured layers of calcareous loam, silty clay loam, and silty clay. When the soil is dry, cracks that are 1 to 2 inches wide and 4 to 12 inches apart occur. The soil is calcareous or noncalcareous; the heavy clay layers are generally noncalcareous and the coarser textured layers are calcareous.

These Bowdoin soils differ from the established Bowdoin series because there is no lime between depths of 10 and 20 inches. This difference does not alter their use and management.

5—Bowdoin clay. This nearly level soil is on flood plains and low stream terraces. Slopes range from 0 to 2 percent.

Included with this soil in mapping are a few small areas where the surface layer is silty clay loam. Small areas of Harlem and Vaeda soils are also included.

Surface runoff is slow, and the hazard of wind and water erosion is slight. Bowdoin soils are subject to rare flooding.

This soil is used primarily for irrigated hay and pasture. A few areas are used for irrigated wheat and barley when farmed in association with soils that are better suited to these crops. The soil is also used for range and wildlife habitat.

This soil is best suited to pasture and hay. Capability unit VIs–1, dryland and irrigated; Dense Clay range site; windbreak suitability group 4.

Cabbart series

The Cabbart series consists of shallow, well drained soils that formed in material weathered from sandstone. The soils are on uplands. Soft sandstone is at a depth of about 11 inches. Slopes are 5 to 35 percent. The native vegetation is mainly bluebunch wheatgrass, needleandthread, western wheatgrass, little bluestem, plains muhly, blue grama, junegrass, and some forbs.

In a representative profile the surface layer is pale brown loam about 4 inches thick. The underlying material to a depth of 16 inches is light gray and light olive gray loam. Soft sandstone is below 16 inches.

Permeability is moderate, and the available water capacity is very low or low. Reaction is moderately alkaline to a depth of 16 inches.

These soils are mainly used for range and as wildlife habitat.

Representative profile of Cabbart loam, in an area of Cabbart-Delpoint complex, 9 to 35 percent slopes, in native grass, 100 feet south of the trail, 2,650 feet west and 1,350 feet south of the northeast corner of sec. 2, T. 24 N., R. 38 E.:

A1—0 to 4 inches, pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; weak thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C1ca—4 to 11 inches, light gray (10YR 7/2) loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common fine soft masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

C2—11 to 16 inches, light olive gray (5Y 6/2) soft weathered platy sandstone that rubs to a loam texture, olive (5Y 5/3) moist; common very fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3r—16 to 60 inches, light yellowish brown (2.5Y 6/4) soft platy sandstone, light olive brown (2.5Y 5/4) moist; few roots in upper part; slightly effervescent.

Soft sandstone is at a depth of 10 to 20 inches. The clay content throughout the profile ranges from 20 to 30 percent.

6—Cabbart-Delpoint complex, 9 to 35 percent slopes. This complex consists of strongly rolling and hilly soils on uplands that are dissected by deep intermittent stream valleys. About 45 percent is Cabbart loam, and about 40 percent is Delpoint loam. The Cabbart soil in this complex has the profile described as representative of the Cabbart series. The Delpoint soil in this complex has the profile described as representative of the Delpoint series. Cabbart loam is on side slopes and tops of hills and ridges. Delpoint loam is on the lower part of side slopes.

Included with these soils in mapping are some areas where the surface layer and underlying material are sandy loam, and some small areas where the depth to sandstone is less than 20 inches. Small areas of Evanston soils are on short fans on the lower parts of the landscape. Also included are small areas of sandstone outcrop on ridgetops and at the tops of slopes. Minor soil inclusions make up about 15 percent of the unit.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

Soils in this complex are suited to range and wildlife habitat. Capability unit VIIe–1, dryland; windbreak suitability group 4; Cabbart soil in Shallow range site, Delpoint soil in Silty range site.

Cambert series

The Cambert series consists of moderately deep, well drained soils that formed in material weathered from soft siltstone and sandstone. The soils are on uplands. Soft siltstone and sandstone beds are at a depth of about 28 inches. Slopes are 2 to 25 percent. The native vegetation is mainly bluebunch wheatgrass, western wheatgrass, green needlegrass, needleandthread, blue grama, prairie junegrass, Sandberg bluegrass, and some forbs.

In a representative profile the surface layer is yellowish brown silt loam about 4 inches thick. The subsoil

is 12 inches of yellowish brown and light yellowish brown silt loam. The underlying material, to a depth of 28 inches, is brownish yellow silt loam. Soft siltstone and sandstone beds are below.

Permeability and the available water capacity are moderate. Reaction is moderately alkaline to a depth of about 28 inches and strongly alkaline below.

These soils are used mainly for range, dryfarmed crops, and wildlife habitat.

Representative profile of Cambert silt loam, in an area of Reeder-Doney-Cambert complex, 9 to 35 percent slopes, in native grass, 1,700 feet east and 1,500 feet south of the northwest corner of sec. 4, T. 34 N., R. 42 E.:

A1—0 to 4 inches, yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak medium platy structure; slightly hard, friable, sticky and plastic; many fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

B2—4 to 9 inches, yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak coarse prismatic structure; hard, friable, sticky and plastic; common very fine roots; many fine tubular pores; common fine seams of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

B3ca—9 to 16 inches, light yellowish brown (10YR 6/4) silt loam, yellowish brown (10YR 5/6) moist; weak coarse prismatic structure; hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; many fine and medium soft masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

C1—16 to 28 inches, brownish yellow (10YR 6/6) silt loam, yellowish brown (10YR 5/6) moist; massive; hard, friable, sticky and plastic; common very fine roots; common very fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.

C2r—28 to 60 inches, light gray (2.5Y 7/2) soft siltstone and sandstone beds that rub to silt loam and very fine sandy loam, light yellowish brown (2.5Y 6/4) moist; few roots in upper part; strongly alkaline.

The soil is silt loam or silty clay loam that is 18 to 35 percent clay. Soft silt and sandstone are at a depth of 20 to 40 inches.

Delpoint series

The Delpoint series consists of moderately deep, well drained soils that formed in material weathered from sandstone. The soils are on uplands. Soft sandstone is at a depth of about 32 inches. Slopes are 9 to 25 percent. The native vegetation is mainly bluebunch wheatgrass, western wheatgrass, green needlegrass, needleandthread, blue grama, prairie junegrass, and some forbs.

In a representative profile the surface layer is pale brown loam about 5 inches thick. The subsoil is 17 inches of pale brown loam. The underlying material, to a depth of 32 inches, is pale yellow loam. Soft sandstone is below.

Permeability and the available water capacity are moderate. Reaction is mildly alkaline to a depth of 5 inches and moderately alkaline below that depth to the sandstone.

These soils are mainly used for range and wildlife habitat.

Representative profile of Delpoint loam, in an area of Cabbart-Delpoint complex, 9 to 35 percent slopes, in native grass, 100 feet south of the trail, 2,650 feet west and 120 feet south of the northeast corner of sec. 2, T. 24 N., R. 38 E.:

A1—0 to 5 inches, pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; weak thin platy structure that parts to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

B—5 to 22 inches, pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; weak medium prismatic structure that parts to weak medium angular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; few small flat sandstone fragments with thin lime casts on lower sides; strongly effervescent; moderately alkaline; gradual smooth boundary.

C1ca—22 to 32 inches, pale yellow (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; few small flat sandstone fragments with thin lime casts on lower sides; common fine distinct soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2r—32 to 60 inches, pale olive (5Y 6/3) soft sandstone, light olive brown (2.5Y 5/4) moist; reddish yellow (7.5YR 6/6) iron stains; few very fine roots in upper part.

The profile is 18 to 30 percent clay. Soft sandstone is at a depth of 20 to 40 inches.

Dilts series

The Dilts series consists of shallow, well drained soils that formed in material weathered from clay shale. The soils are on uplands. Clay shale bedrock is at a depth of about 14 inches. Slopes are 5 to 35 percent. The native vegetation is mainly western wheatgrass, bluebunch wheatgrass, green needlegrass, plains muhly, prairie sandreed, and shrubs.

In a representative profile the surface layer and underlying material is gray clay and shale clay. Shale is at a depth of 14 inches.

Permeability is slow, and the available water capacity is very low. The reaction is very strongly acid throughout the profile.

These soils are mainly used for range and wildlife habitat.

Representative profile of Dilts clay, in an area of Lisam-Dilts clays, 5 to 35 percent slopes, in native grass, 1,400 feet east and 1,500 feet south of the northwest corner of sec. 23, T. 27 N., R. 37 E.:

A1—0 to 4 inches, gray (10YR 6/1) clay, dark grayish brown (2.5Y 4/2) moist; strong very fine granular structure; hard, firm, sticky and plastic; common very fine roots; very strongly acid; clear smooth boundary.

C1—4 to 9 inches, gray (10YR 6/1) clay, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; hard, firm, sticky and plastic; common very fine roots; very strongly acid; clear smooth boundary.

C2—9 to 14 inches, gray (2.5Y 6/1) shaly clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; common very fine roots; very strongly acid; clear smooth boundary.

C3r—14 to 60 inches, gray (5Y 6/1) thin platy clay shale, dark gray (5Y 4/1) moist; roots bunching at upper boundary, few extending below; brown stains on shale.

The A and C horizons range from gray to light olive gray. Clay shale is at a depth of 10 to 20 inches. Reaction is very strongly acid or strongly acid throughout.

Doney series

The Doney series consists of moderately deep, well drained soils that formed in material weathered from sandstone and siltstone. The soils are on uplands. Soft sandstone and siltstone is at a depth of about 23 inches. Slopes are 4 to 35 percent. The native vegetation is mainly bluebunch wheatgrass, western wheatgrass, green needlegrass, needleandthread, blue grama, prairie junegrass, Sandberg bluegrass, and some forbs.

In a representative profile the surface layer is brown loam about 5 inches thick. The underlying material, to a depth of 23 inches, is light gray loam. Soft sandstone and siltstone are below 23 inches.

Permeability and the available water capacity are moderate. Reaction is mildly alkaline in the surface layer and moderately alkaline below.

These soils are used mainly for range, dryfarmed crops, and wildlife habitat.

Representative profile of Doney loam, in an area of Reeder-Cambert-Doney complex, 2 to 9 percent slopes, in native grass, 100 feet west and 20 feet south of the northwest corner of sec. 31, T. 32 N., R. 45 E.:

A1—0 to 5 inches, brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many very fine tubular pores; mildly alkaline; clear smooth boundary.

C1ca—5 to 23 inches, light gray (10YR 7/2) loam, brown (10YR 5/3) moist; weak medium prismatic structure; slightly hard, very friable, slightly sticky and plastic; common very fine roots; many very fine tubular pores; many fine seams and soft masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

C2r—23 to 60 inches, light gray (5Y 7/1) soft sandstone and siltstone, grayish brown (2.5Y 5/2) moist; few reddish yellow (7.5YR 6/6) iron stains on sandstone; few very fine roots in the upper part; strongly effervescent; moderately alkaline.

The soil is 18 to 30 percent clay. Soft sandstone and siltstone is at a depth of 20 to 40 inches.

Dooley series

The Dooley series consists of deep, well drained soils that formed in alluvium. The soils are on uplands. Slopes are 0 to 15 percent. The native vegetation is mainly needleandthread, prairie sandreed, little bluestem, western wheatgrass, blue grama, threadleaf sedge, and forbs.

In a representative profile the surface layer is dark grayish brown sandy loam about 7 inches thick. The subsoil is 10 inches of brown sandy clay loam. The underlying material is grayish brown sandy loam to a depth of about 26 inches and light olive gray clay to a depth of 60 inches or more.

Permeability is moderate to a depth of about 26 inches and moderately slow below that depth. The available water capacity is high. Reaction is neutral or mildly alkaline to about 17 inches, mildly alkaline or moderately alkaline to about 26 inches, and moderately alkaline below.

These soils are used mainly for dryfarmed crops, pasture, and wildlife habitat.

Representative profile of Dooley sandy loam, in an area of Tally-Dooley sandy loams, 5 to 15 percent slopes, in a cultivated field, 2,600 feet south and 200 feet east of the northwest corner of sec. 16, T. 33 N., R. 43 E.:

Ap—0 to 7 inches, dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure that parts to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; mildly alkaline; abrupt smooth boundary.

B2t—7 to 17 inches, brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure; hard, friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; many moderately thick very dark grayish brown (10YR 3/2) moist clay films on faces of peds and bridging sand grains; neutral; gradual smooth boundary.

C1ca—17 to 26 inches; grayish brown (2.5Y 5/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; com-

mon very fine roots; common medium soft masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

IIC2ca—26 to 60 inches; light olive gray (5Y 6/2) clay, olive gray (5Y 4/2) moist; moderate fine granular structure; hard, firm, sticky and plastic; few very fine roots; few pebbles; many medium soft masses of lime; strongly effervescent; moderately alkaline.

The thickness of the A and B horizons combined ranges from 12 to 20 inches. The B2t horizon is 20 to 30 percent clay. The lower part of the C horizon is stratified in some pedons.

Elloam series

The Elloam series consists of deep, well drained soils that formed in glacial till. The soils are on glaciated uplands. Slopes range from 1 to 15 percent. The native vegetation is mainly western wheatgrass, green needlegrass, Sandberg bluegrass, Nuttall saltgrass, saltgrass, and some forbs and shrubs.

In a representative profile the surface layer when mixed to a depth of 6 inches in light gray and pale brown clay loam. The subsoil extends to a depth of 20 inches. The upper part of the subsoil is pale brown clay and the lower part is light brownish gray heavy clay loam. The underlying material is gray and light brownish gray clay loam to a depth of 60 inches or more.

Permeability is slow, and the available water capacity is moderate or high. Reaction is mildly alkaline or moderately alkaline to about 6 inches and moderately alkaline or strongly alkaline below.

These soils are mainly used for range and wildlife habitat. Some areas are used for dryfarmed crops.

Representative profile of Elloam clay loam, 1 to 5 percent slopes, in native grass, 50 feet south and 1,700 feet east of the northwest corner of sec. 13, T. 27 N., R. 38 E.:

A2—0 to 3 inches, light gray (10YR 7/2) loam, brown (10YR 5/3) moist; strong very thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many unstained silt and sand grains on plates; mildly alkaline; abrupt smooth boundary.

B21t—3 to 6 inches, pale brown (10YR 6/3) clay, dark brown (10YR 4/3) moist; strong medium columnar structure that parts to strong medium angular blocky; very hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; continuous moderately thick clay film on faces of peds; 5 percent pebbles; moderately alkaline; clear smooth boundary.

B22t—6 to 10 inches, pale brown (10YR 6/3) clay, dark brown (10YR 4/3) moist; moderate medium prismatic structure that parts to moderate medium angular blocky; very hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; continuous moderately thick clay film on faces of peds; 5 percent pebbles; moderately alkaline; clear smooth boundary.

B3ca—10 to 20 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure that parts to moderate medium angular blocky; common very fine roots; many very fine tubular pores; 5 percent pebbles; strongly effervescent; strongly alkaline; clear smooth boundary.

C1cacs—20 to 43 inches, gray (10YR 5/1) clay loam, dark gray (10YR 4/1) moist; weak medium prismatic structure that parts to weak coarse angular blocky; hard, friable, sticky and plastic; few very fine roots; 5 percent pebbles; many seams and soft masses of gypsum and other salts to 30 inches, common seams and soft masses of gypsum and other salts below; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—43 to 60 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; few very fine roots; 5 percent pebbles; strongly effervescent; moderately alkaline.

In native grass the A2 horizon is 1 to 4 inches thick. Where cultivated, the Ap horizon is mainly clay loam. The soil is noncalcareous to a depth of 5 to 10 inches. It is 1 to 8 percent pebbles. The B2t horizon is light clay that ranges from 40 to 45 percent clay.

7—Elloam clay loam, 1 to 5 percent slopes. This level and undulating soil is on glaciated uplands. It has the profile described as representative of the series.

Included in mapping are a few small areas of Phillips, Vaeda, and Thoeny soils. Small areas of Phillips soils occupy convex parts of the landscape and are a few inches higher than the Elloam soils. Vaeda soils are mainly along drainageways and on the lower parts of fans. Small areas of Thoeny soils occupy slightly higher, convex parts of the landscape. Also included with this soil in mapping are a few small areas where the surface layer is gravelly.

Surface runoff is medium or rapid, and the hazard of wind and water erosion is moderate.

This soil is suited mainly for range and wildlife habitat. A few small areas are used for wheat and barley. Capability unit IVs–3, dryland; Dense Clay range site; windbreak suitability group 3S.

8—Elloam gravelly clay, 2 to 9 percent slopes. This undulating and gently rolling soil is on glaciated uplands. It has a profile similar to that described as representative of the series, except it has a thinner surface layer that is mostly gravelly clay. Also, salt content is higher nearer the surface.

Included with this soil in mapping are a few areas where shale is at depths of 30 to 60 inches and some small areas of Lisam, Thebo, and Nobe soils. Small areas of rock outcrop and Vaeda, Sunburst, Phillips, and Thoeny soils are also included.

Surface runoff is medium or rapid. The hazard of

wind erosion is slight, and the hazard of water erosion is moderate.

This soil is suited to range and wildlife habitat. Capability unit VIs–1, dryland; Dense Clay range site; windbreak suitability group 4.

9—Elloam-Sunburst clay loams, 9 to 35 percent slopes. This complex consists of strongly sloping and moderately steep soils on glaciated uplands. About 60 percent is Elloam clay loam, and 30 percent is Sunburst clay loam. Elloam soils are mainly on foot slopes and side slopes. Slopes are 9 to 15 percent. Sunburst soils occupy ridgetops and the steeper side slopes.

Included with these soils in mapping are some areas where clay shale is at depths of 20 to 40 inches, and some areas where soils are gravelly and cobbly on the surface. Also included are Lisam, Thebo, and Phillips soils and some small areas of shale outcrop on steep side slopes. These inclusions make up about 10 percent of this unit.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

These soils are suited to range and wildlife habitat. Capability unit VIe–1, dryland; windbreak suitability group 4; Elloam soil in Dense Clay range site, Sunburst soil in Thin Hilly range site.

Evanston series

The Evanston series consists of deep, well drained soils that formed in alluvium. The soils occupy fans, terraces, foot slopes, and uplands. Slopes are 0 to 9 percent. The native vegetation is mainly needleandthread, western wheatgrass, green needlegrass, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and some forbs.

In a representative profile the surface layer is grayish brown loam about 5 inches thick. The subsoil is 12 inches of grayish brown clay loam. The underlying material, to a depth of 32 inches, is light brownish gray clay loam. Below that it is light brownish gray loam to a depth of 60 inches or more.

Permeability is moderate, and the available water capacity is high. Reaction is mildly alkaline above a depth of about 17 inches and is moderately alkaline below.

These soils are used for range, for wildlife habitat, for dryfarmed crops, and for pasture.

Representative profile of Evanston loam, 2 to 9 percent slopes, in a cultivated area, 600 feet west and 2,200 feet north of the southeast corner of sec. 20, T. 24 N., R. 36 E.:

Ap—0 to 5 inches, grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate thin platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; mildly alkaline; abrupt smooth boundary.

B2t—5 to 11 inches, grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; hard, friable, sticky and slightly plastic; many very fine roots; many fine tubular pores; many thin very dark grayish brown (10YR 3/2 moist) clay films on faces of peds; mildly alkaline; clear smooth boundary.

B3—11 to 17 inches, grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse prismatic structure; slightly hard, friable, sticky and slightly plastic; common very fine roots; many fine tubular pores; mildly alkaline; clear smooth boundary.

C1ca—17 to 22 inches, light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, sticky and slightly plastic; common very fine roots; many fine tubular pores; common soft masses and seams of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2ca—22 to 32 inches, light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, sticky and slightly plastic; few very fine roots; common soft masses and seams of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3—32 to 60 inches, light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; strongly effervescent; moderately alkaline.

The thickness of the A and B horizons combined ranges from 10 to 20 inches. The B2t horizon is 28 to 35 percent clay.

10—Evanston loam, 0 to 2 percent slopes. This nearly level soil is on alluvial fans and terraces.

Included with this soil in mapping are some small areas where the underlying material is sandy loam. Small areas of Attewan, Absher, and Phillips soils are also included.

Surface runoff is slow. The hazard of wind erosion is moderate, and the hazard of water erosion is slight.

This soil is suited to growing dryfarmed wheat, barley, oats, hay, and pasture. It is also suited to range and wildlife habitat. Capability unit IIIe–1, dryland; Silty range site; windbreak suitability group 1.

11—Evanston loam, 2 to 9 percent slopes. This gently sloping and moderately sloping soil is on fans and foot slopes of uplands. It has the profile described as representative of the series.

Included with this soil in mapping are some areas of soils that have a clay loam surface layer. Small areas of Delpoint, Marias, Phillips, and Vadea soils are also included.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

This soil is suited to dryfarmed wheat, barley, oats, hay, and pasture. It is also suited to range and wildlife habitat. Capability unit IIIe–1, dryland; Silty range site; windbreak suitability group 1.

12—Evanston loam, sandstone substratum, 2 to 5 percent slopes. This undulating soil is on uplands. It has a profile similar to that described as representative of the series, except soft sandstone is at a depth of 40 to 60 inches.

Included with this soil in mapping are some small areas of Phillips soils in concave parts of the landscape and some Delpoint soils in convex parts.

Surface runoff is medium, and the hazard of water and wind erosion is moderate.

This soil is suited to dryfarmed wheat, barley, oats, hay, and pasture. It is also suited to range and wildlife habitat. Capability unit IIIe–1, dryland; Silty range site; windbreak suitability group 1.

13—Evanston-Lonna loams, 2 to 9 percent slopes. This complex consists of undulating and gently rolling soils on uplands. About 50 percent is Evanston loam, and about 40 percent is Lonna loam.

The Evanston soil is on sides of low ridges and knolls. The Lonna soil is on tops and crests of low ridges and knolls. It has a profile similar to the one described as representative of the Lonna series except the surface layer is loam.

Included with these soils in mapping are areas of Phillips soils and soils that have a silt loam surface layer. These inclusions make up about 10 percent of this unit.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

Soils in this complex are suited to dryfarmed wheat, barley, oats, hay, and pasture. They are also suited to range and wildlife habitat. Capability unit IIIe–1, dryland; Silty range site; windbreak suitability group 1.

14—Evanston-Marias complex, 3 to 9 percent slopes. This complex consists of gently sloping and moderately sloping soils on fans and foot slopes of uplands, which are dissected by intermittent drainageways. About 50 percent is Evanston loam, and about 40 percent is Marias clay. Evanston and Marias soils occupy similar positions on the fans and foot slopes. They occur in an unpredictable pattern on the landscape.

Included with these soils in mapping are small areas of soils that have a clay loam surface layer. Also included are Thebo and Vaeda soils. These inclusions make up about 10 percent of this map unit.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

The soils are suited to range and wildlife habitat. To a lesser degree, they are suited to dryfarmed wheat and barley. Capability unit IVe–3, dryland; windbreak suitability group 1; Evanston soil in Silty range site, Marias soil in Clayey range site.

15—Evanston-Marmarth loams, 3 to 12 percent slopes. This complex consists of undulating to strongly rolling soils on uplands. About 50 percent is Evanston loam, and about 30 percent is Marmarth loam.

The Evanston soil is on smooth foot slopes and short fans where slopes are less than 9 percent. The Marmarth soil is on side slopes and on convex parts of the landscape. It has the profile described as representative of the Marmarth series.

Included with these soils in mapping are Delpoint and Cabbart soils, on knolls and ridges. Small areas of Rock outcrop are on some ridgetops. These inclusions make up about 20 percent of this map unit.

Surface runoff is medium, and the hazard of erosion by wind and water is moderate.

Soils are suited to dryfarmed wheat, barley, oats, and pasture. They are also suited to range and wildlife habitat.

Capability unit IVe–3, dryland; Silty range site; Evanston soil in windbreak suitability group 1, Marmarth soil in windbreak suitability group 2M.

Farnuf series

The Farnuf series consists of deep, well drained soils that formed in alluvium. The soils are on uplands and on fans and terraces. Slopes are 0 to 15 percent. The native vegetation is mainly western wheatgrass, green needlegrass, needleandthread, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and some forbs.

In a representative profile the surface layer is brown loam about 7 inches thick. The subsoil is 16 inches of brown and grayish brown clay loam. The underlying material, to a depth of 36 inches, is grayish brown loam. Below that it is light brownish gray clay loam to a depth of 60 inches or more.

Permeability is moderate. The available water capacity is high. Reaction is slightly acid to a depth of about 7 inches, neutral or mildly alkaline to a depth of about 23 inches, and moderately alkaline below.

These soils are used mainly for dryfarmed crops, pasture, range, and wildlife habitat.

Representative profile of Farnuf loam, 0 to 5 percent slopes, in cultivated field, 2,300 feet north and 150 feet west of the southeast corner of sec. 16, T. 35 N., R. 43 E.:

Ap—0 to 7 inches, brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak coarse blocky structure that parts to weak fine granular; slightly hard, friable, sticky and slightly plastic; common very fine roots; slightly acid; abrupt smooth boundary.

B2t—7 to 18 inches, brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure; hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; many moderately thick very dark grayish brown (10YR 3/2 moist) clay films on faces of peds; neutral; gradual smooth boundary.

B3t—18 to 23 inches, grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; slightly hard, very friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; common thin clay films on faces of peds; slightly effervescent in spots; mildly alkaline; gradual smooth boundary.

C1ca—23 to 36 inches, grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; 15 percent pebbles with lime casts on their lower sides; common fine seams and soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2ca—36 to 50 inches, light brownish gray (2.5Y

6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; few very fine roots; common fine seams and soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3—50 to 60 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and plastic; common fine soft masses of lime; strongly effervescent; moderately alkaline.

The A horizon is brown or grayish brown. Thickness of the A horizon and noncalcareous part of the B2t horizon combined ranges from 12 to 20 inches. The B horizon is from 30 to 35 percent clay. The soil is 0 to 20 percent pebbles.

16—Farnuf loam, 0 to 5 percent slopes. This nearly level and undulating soil is on alluvial fans and uplands. It has the profile described as representative of the series.

Included with this soil in mapping are some small areas of soils that are very gravelly below a depth of 20 to 40 inches and some small areas where loose sand or sand and gravel is below a depth of 40 inches. Also included are some small areas of Martinsdale and Turner soils and small areas where the surface layer is clay loam.

Surface runoff is medium. The hazard of wind and water erosion is moderate.

This soil is suited to dryfarmed wheat, barley, oats, pasture, and hay. It is also suited for range and wildlife habitat. Capability unit IIIe–2, dryland; Silty range site; windbreak suitability group 1.

17—Farnuf loam, 5 to 9 percent slopes. This undulating and gently rolling soil is on uplands.

Included with this soil in mapping are small areas of Martinsdale, Turner, and Tinsley soils. Martinsdale soils are on smooth side slopes, and Turner and Tinsley soils are on convex parts of the landscape. Also included are small areas where the surface layer is gravelly to very gravelly loam.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

This soil is suited to dryfarmed wheat, barley, oats, pasture, and hay. It is also suited to range and wildlife habitat. Capability unit IIIe–2, dryland; Silty range site; windbreak suitability group 1.

18—Farnuf loam, gravelly substratum, 0 to 5 percent slopes. This nearly level and gently sloping soil is on alluvial fans and terraces. It has a profile similar to that described as representative of the series, except the underlying material below a depth of 36 inches is very gravelly loam and very gravelly sandy loam. The soil is 35 to 60 percent gravel below a depth of 36 inches.

Included with this soil in mapping are some small areas of Farnuf soils that have no gravelly substratum. Also included in mapping are some small areas of Turner soils.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

This soil is suited to dryfarmed wheat, barley, oats, pasture, and hay. It is also suited to range and wildlife habitat. Capability unit IIIe–2, dryland; Silty range site; windbreak suitability group 2M.

19—Farnuf-Reeder loams, 2 to 5 percent slopes. This complex consists of undulating soils on uplands. About 50 percent is Farnuf loam, and 40 percent is Reeder loam.

The Farnuf soil in this complex has a profile similar to that described as representative of the Farnuf series, except that soft sandstone or siltstone is at depths of 40 to 60 inches. Farnuf loam occupies lower side slopes and flat parts of the landscape, and Reeder loam is on convex parts.

Included with these soils in mapping are some small areas of Farnuf soils that have sandstone or siltstone between 40 and 60 inches. Also included are small areas of soils that are silty clay loam. These inclusions make up about 10 percent of this map unit.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

Soils in this complex are suited to dryfarmed wheat, barley, oats, hay, and pasture. They are also suited to range and wildlife habitat. Capability unit IIIe–2, dryland; Silty range site; Farnuf soil in windbreak suitability group 1, Reeder soil in windbreak suitability group 2M.

20—Farnuf-Tinsley-Reeder association, hilly. This association consists of strongly sloping to hilly soils on uplands. Slopes are 9 to 25 percent. A typical area of this association is about 50 percent Farnuf loam, 20 percent Tinsley very gravelly sandy loam, and 20 percent Reeder loam. Included with these soils in mapping are small areas of other soils that make up about 10 percent of the unit. Farnuf and Reeder loams are mainly on foot slopes and side slopes, where the slope is 9 to 15 percent. Tinsley very gravelly sandy loam is on ridgetops and upper side slopes.

Surface runoff is rapid, and the hazard of wind and water erosion is moderate.

These soils are suited to range and wildlife habitat. Farnuf and Reeder soils in capability unit IVe–3, dryland; Tinsley soil in capability unit VIe–1, dryland. Farnuf and Reeder soils in Silty range site; Tinsley soil in Gravel range site. Farnuf soil in windbreak suitability group 1; Reeder soil in windbreak suitability group 2M; Tinsley soil in windbreak suitability group 4.

Fluvaquentic Haploborolls

21—Fluvaquentic Haploborolls, gently sloping. This unit consists of nearly level and gently sloping soils that formed in alluvium on bottom lands and low terraces along intermittent streams. It is mainly in the northeastern part of the county. Slopes are 0 to 5 percent. The soils are dark gray loam and clay loam in the surface layer and underlying material. In some places they are gravelly below 20 inches. These soils are dominantly somewhat poorly drained; however, in a few small areas, soils are poorly drained. The water table fluctuates between depths of 30 and 60 inches.

Surface runoff is slow, and the hazard of wind and water erosion is slight. These soils are subject to common flooding.

They are suited to range, pasture, and wildlife habi-

tat. Capability unit VIw-1, dryland; Subirrigated range site; windbreak suitability group 4.

Glendive series

The Glendive series consists of deep, well drained soils that formed in stratified, calcareous alluvium of mixed origin. The soils are on flood plains and low terraces along the major streams; some areas are along minor streams. Slopes are 0 to 3 percent. The native vegetation is mainly western wheatgrass, green needlegrass, bluebunch wheatgrass, needleandthread, blue grama, prairie junegrass, and some forbs. Cottonwood trees, willows, wild roses, and snowberry also grow on these soils.

In a representative profile the surface layer is grayish brown loam about 8 inches thick. The underlying material is light brownish gray stratified fine sandy loam, loam, and loamy fine sand to a depth of 60 inches or more.

Permeability is moderate in the surface layer and moderately rapid in the underlying material. The available water capacity is moderate. Reaction throughout the profile is moderately alkaline.

These soils are used for irrigated cropland, range, and wildlife habitat.

Representative profile of Glendive loam, in an area of Havre-Glendive complex, in a cultivated field, 650 feet south and 2,500 feet east of the northwest corner of sec. 3, T. 30 N., R. 36 E.:

Ap—0 to 8 inches, grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse angular blocky structure; hard, friable, sticky and slightly plastic; common fine roots, slightly effervescent; moderately alkaline; abrupt smooth boundary.

C1—8 to 40 inches, light brownish gray (2.5Y 6/2) fine sandy loam and thin strata of loamy fine sand, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure to about 20 inches, massive below; slightly hard, very friable, slightly sticky; few fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

C2—40 to 60 inches, light brownish gray (2.5Y 6/2) stratified loam and fine sandy loam, dark grayish brown (2.5Y 4/2) moist; few fine distinct dark brown (7.5YR 4/4) mottles, moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; slightly effervescent; moderately alkaline.

The A horizon is grayish brown, light brownish gray, or pale brown. Thin strata in the C horizon range in texture from loam to sand. In some places loose sand is below a depth of 40 inches.

Harlem series

The Harlem series consists of deep, well drained soils that formed in stratified, fine and moderately fine textured alluvium of mixed origin. The soils occupy flood plains and low terraces along the major streams and rivers. Slopes are 0 to 2 percent. The native vegetation is mainly western wheatgrass, green needlegrass bluebunch wheatgrass, prairie junegrass, Sandberg bluegrass, and some forbs.

In a representative profile the surface layer is gray clay about 6 inches thick. The underlying material is light brownish gray and gray silty clay and silty clay loam to a depth of 72 inches or more.

Permeability is slow, and the available water capacity is high. Reaction is mildly and moderately alkaline.

These soils are used for irrigated and dryfarmed crops and, to a small extent, for range. They are also used for wildlife habitat.

Representative profile of Harlem clay, in a cultivated field, 800 feet north and 800 feet east of the southwest corner of sec. 29, T. 28 N., R. 40 E.:

Ap—0 to 6 inches, gray (5Y 6/1) clay, dark grayish brown (2.5Y 4/2) weak medium angular blocky structure parting to moderate fine granules; very hard, firm, sticky and plastic; common fine roots; common fine interstitial pores; mildly alkaline; clear smooth boundary.

C1—6 to 12 inches, light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak medium angular structure; very hard, firm, sticky and plastic; common very fine roots; common fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.

C2cs—12 to 36 inches, gray (5Y 6/1) silty clay, dark grayish brown (2.5Y 4/2) moist; weak medium angular blocky structure; very hard, firm, sticky and plastic; common very fine roots; common fine tubular pores; few slickensides; few fine soft masses of lime; common fine seams and nests of gypsum; strongly effervescent; moderately alkaline; clear smooth boundary.

C3—36 to 72 inches, light brownish gray (2.5Y 6/2) stratified silty clay and silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; common very fine roots to 51 inches, few extend below; few fine tubular pores; few fine seams and nests of gypsum; strongly effervescent; moderately alkaline.

The A horizon is clay, silty clay, or silty clay loam. Thin lenses of loam, silt loam, or clay loam are throughout the C horizon in some places. The C horizon is 35 to 60 percent clay between depths of 10 and 40 inches. In some places the soil is mainly clay or silty clay, without stratification of the coarser textures, to a depth of about 40 inches.

22—Harlem silty clay loam. This nearly level soil occupies flood plains and low terraces along major streams. Slopes are 0 to 2 percent. The soil has a profile similar to that described as representative of the series, except the surface layer is silty clay loam.

Included with this soil in mapping are some small areas where the surface layer is clay. Also included in mapping are a few small areas of Havre soils.

Surface runoff is slow. The hazard of wind erosion is moderate, and the hazard of water erosion is slight. This soil is subject to rare flooding.

The soil is suited to irrigated crops, dryfarmed crops, range, and wildlife habitat. The main irrigated crops are wheat, barley, oats, corn for silage, alfalfa and tame grass hay, and pasture. The main dryfarmed crops are wheat, barley, oats, hay, and pasture. Capability unit IIIs–2, dryland, and capability unit IIs–1, irrigated; Clayey range site; windbreak suitability group 1.

23—Harlem clay. This nearly level soil occupies flood plains and low terraces along major streams. Slopes are 0 to 2 percent. The soil has the profile described as representative for the series.

Included with this soil in mapping are a few small areas of Bowdoin and Havre soils. Also included are a few small areas where the surface layer is silty clay or silty clay loam and some small areas that are moderately to strongly saline.

Surface runoff is slow. The hazard of wind erosion is moderate, and the hazard of water erosion is slight. This soil is subject to rare flooding.

This soil is suited to irrigated crops, dryfarmed crops, range, and wildlife habitat. The main irrigated crops are wheat, barley, oats, corn silage, alfalfa and tame grass hay, and pasture. The main dryfarmed crops are wheat, barley, hay, and pasture. Capability unit IVs–2, dryland, and capability unit IIIs–1, irrigated; Clayey range site; windbreak suitability group 1.

24—Harlem clay, wet. This nearly level soil is on flood plains and low terraces along streams. Slopes are 0 to 2 percent. This soil has a profile similar to that described as representative of the series, except it is slightly saline to moderately saline and has a water table at a depth of 4 to 6 feet during the growing season. A few small areas of this soil are strongly saline. Excess water results from poor irrigation practices and seepage from irrigation ditches and canals. The continued presence of excess water in the soil increases salinity and makes many areas unsuitable for most crops. Proper irrigation management and drainage are needed to reduce soil wetness and salinity.

Surface runoff is slow. The hazard of wind erosion is moderate, and the hazard of water erosion is slight. This soil is subject to rare flooding.

This soil is suited to growing irrigated wheat, barley, oats, alfalfa and tame grass hay, and pasture. It is also used for wildlife habitat. Capability unit IIIw–1, irrigated; not assigned to a range site; windbreak suitability group 2S.

Havre series

The Havre series consists of deep, well drained soils that formed in alluvium. These soils occupy flood plains and low terraces along streams. Slopes are 0 to 2 percent. The native vegetation is mainly western wheatgrass, green needlegrass, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and forbs. Cottonwood trees, willows, wild roses, and snowberry also grow on these soils.

In a representative profile the surface layer is grayish brown silty clay loam about 5 inches thick. The underlying material is light brownish gray stratified silty clay loam and loam to a depth of 65 inches or more.

Permeability is moderate. The available water capacity is high. Reaction is moderately alkaline in both the surface layer and in the underlying material.

These soils are used mainly for irrigated crops. Some areas are used for dryfarmed crops, range, and wildlife habitat.

Representative profile of Havre silty clay loam, in a cultivated field, 2,000 feet east and 1,000 feet south of the northwest corner of sec. 15, T. 30 N., R. 37 E.:

Ap—0 to 5 inches, grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium angular blocky structure; hard, friable, sticky and slightly plastic; common very fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C1—5 to 8 inches, light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium platy structure; hard, friable, sticky and slightly plastic; common very fine roots; common fine tubular pores; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—8 to 45 inches, light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak thin platy structure; hard, very friable, sticky and slightly plastic; few very fine roots; common fine tubular pores; moderately alkaline; clear smooth boundary.

C3—45 to 65 inches, light brownish gray (2.5Y 6/2) stratified loam and silty clay loam; few medium distinct strong brown (7.5YR 5/6) mottles, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and slightly plastic; strongly effervescent; moderately alkaline.

The A horizon is clay loam, silty clay loam, and silty clay. The stratified C horizon is sandy loam to clay. It is 18 to 35 percent clay between depths of 10 and 40 inches. A few mottles occur below 40 inches in some profiles.

25—Havre silty clay loam. This nearly level soil is on flood plains and stream terraces. Slopes are 0 to 2 percent. The soil has the profile described as representative of the series.

Included with this soil in mapping are some small areas that have a loam, clay loam, or silty clay surface layer. Also included are small areas of Harlem and Glendive soils.

Surface runoff is slow. The hazard of wind erosion is moderate, and the hazard of water erosion is slight. This soil is subject to rare flooding.

This soil is suited to growing irrigated wheat, barley, oats, corn silage, alfalfa and tame grass hay, and pasture. It is suited for dryfarmed wheat, barley, oats, hay, and pasture. It is also suited for range and wildlife habitat. Capability unit IIIe–1, dryland, and capability unit IIe–1, irrigated; Clayey range site; windbreak suitability group 1.

26—Havre-Glendive complex. This complex consists of nearly level and gently undulating soils on flood plains and stream terraces. Slopes are 0 to 3 percent.

The Havre soil is nearly level and Glendive soil is gently undulating. About 65 percent of this complex is Havre silty clay loam, and about 25 percent is Glendive loam. The Glendive soil has the profile described as representative of the Glendive series.

Included with these soils in mapping are a few small areas of Harlem clay soils, a few small areas of soils on convex parts of the landscape where the surface layer is sandy loam, and some areas where loose sand and loamy sand are below a depth of 15 inches. These inclusions make up about 10 percent of this map unit.

Surface runoff is slow, and the hazard of wind and water erosion is moderate. These soils are subject to rare flooding.

Soils in this complex are suited to irrigated wheat, barley, oats, corn silage, alfalfa and tame grass hay, and pasture. They are also suited to range and wildlife habitat. Capability unit IIIe–1, dryland, and capability unit IIe–1, irrigated; Havre soil in Clayey range site, Glendive soil in Silty range site; Havre soil in windbreak suitability group 1, Glendive soil in windbreak suitability group 2M.

27—Havre-Harlem silty clays. This complex consists of nearly level soils on flood plains and stream terraces. Slopes are 0 to 2 percent. About 50 percent of the complex is Havre silty clay, and 40 percent is Harlem silty clay. The Havre soil has a profile similar to that described as representative of the series, except that it has a slowly permeable silty clay surface layer about 12 inches thick. The Harlem soil has a profile similar to that described as representative of the Harlem series, except it has a silty clay surface layer.

Included with these soils in mapping are areas of soils that have a silty clay loam surface layer and make up about 10 percent of this unit.

Surface runoff is slow. The hazard of wind erosion is moderate and the hazard of water erosion is slight. These soils are subject to rare flooding.

Soils in this complex are suited to irrigated wheat, barley, oats, corn silage, alfalfa and tame grass hay, and pasture. They are suited to dryfarmed wheat, barley, oats, hay, and pasture. They are also suited to range and wildlife habitat. Capability unit IIIs–2, dryland, and capability unit IIs–1, irrigated; Clayey range site; windbreak suitability group 1.

28—Havre-Rivra complex. This complex consists of nearly level soils on flood plains and stream terraces. Slopes are 0 to 2 percent. Havre and Rivra soils occupy similar positions on the landscape in this map unit. About 55 percent of the complex is Havre clay loam, and about 25 percent is Rivra clay loam. The Havre soil in this complex has a profile similar to that described as representative of the Havre series, except it has a clay loam surface layer. The Rivra soil in this complex has the profile described as representative of the Rivra series.

Included with these soils in mapping are areas of Havre loam and Rivra gravelly loam and similar soils where the depth to sand and gravel is 20 inches to more than 40 inches. Included soils make up about 20 percent of the unit.

Surface runoff is slow. The hazard of wind erosion is moderate, and the hazard of water erosion is slight. These soils are subject to rare flooding.

Soils in this complex are suited to range and wildlife habitat. They are also suited to dryfarmed wheat, barley, oats, and hay. Capability unit IVs–4, dryland; Havre soil in Clayey range site, Rivra soil in Shallow to Gravel range site; Havre soil in windbreak suitability group 1, Rivra soil in windbreak suitability group 4.

Hillon series

The Hillon series consists of deep, well drained soils that formed in glacial till. The soils are on uplands. Slopes are 9 to 35 percent. The native vegetation is mainly bluebunch wheatgrass, western wheatgrass, little bluestem, needleandthread, sedges, and forbs.

In a representative profile the surface layer is light brownish gray loam about 4 inches thick. The underlying material is light brownish gray clay loam to a depth of 60 inches or more.

Permeability is moderately slow, and the available water capacity is moderate or high. Reaction is moderately alkaline.

These soils are used mainly for range and wildlife habitat. Some areas are used for dryfarmed crops.

Representative profile of Hillon loam, in an area of Hillon-Telstad loams, 9 to 15 percent slopes, in range, 1,400 feet south and 1,600 feet east of the northwest corner of sec. 35, T. 29 N., R. 34 E.:

A1—0 to 4 inches, light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak very thin platy structure that parts to weak very fine granular; slightly hard, very friable, sticky and slightly plastic; many fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C1ca—4 to 30 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium and coarse angular blocky structure; hard, friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; about 3 percent pebbles; common fine seams and soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2ca—30 to 48 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and slightly plastic; few very fine roots; many very fine tubular pores; about 3 percent pebbles; few fine seams and soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3cs—48 to 60 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and slightly plastic; few very fine roots; about 3 percent pebbles; common fine medium seams and soft masses of gypsum; strongly effervescent; moderately alkaline.

The A horizon is grayish brown, light brownish gray, or pale brown. The C horizon is loam or clay loam and is 25 to 35 percent clay. It has few to many seams and

soft masses of lime and gypsum. The soil is 1 to 8 percent pebbles.

29—Hillon loam, 15 to 35 percent slopes. This moderately steep soil occupies side slopes of small valleys on glaciated uplands.

Included in mapping are a few small areas of Sunburst, Telstad, and Tinsley soils.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

This soil is suited to range and wildlife habitat. Capability unit VIe–1, dryland; Thin Hilly range site; windbreak suitability group 4.

30—Hillon-Telstad loams, 9 to 15 percent slopes. This complex consists of strongly rolling soils on glaciated uplands. About 50 percent is Hillon loam, and about 40 percent is Telstad loam. The Hillon soil has the profile described as representative of the Hillon series. The Hillon loam is in convex parts of the landscape on knolls, ridges, and upper side slopes. The Telstad loam is on lower side slopes and foot slopes.

Included with these soils in mapping are some small areas of Phillips soils on foot slopes and in concave parts of the landscape. Also included are some areas of gravelly soils on convex parts. These included soils make up about 10 percent of this map unit.

Surface runoff is medium or rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

Soils in this complex are suited to range and wildlife habitat. To a lesser degree, they are suited to dryfarmed wheat and barley. Capability unit IVe–3, dryland; Silty range site; windbreak suitability group 1.

Judith series

The Judith series consists of deep, well drained soils that formed in alluvium on uplands. Slopes are 1 to 15 percent. The native vegetation is mainly western wheatgrass, needleandthread, plains muhly, prairie junegrass, bluebunch wheatgrass, and some forbs.

In a representative profile the surface layer is gray loam about 6 inches thick. The underlying material to a depth of 36 inches is mainly light gray clay loam. Below that it is pink loam to a depth of 60 inches or more. The underlying material contains large amounts of carbonates.

Permeability is moderate. The available water capacity is moderate or high. Reaction is moderately alkaline to a depth of 36 inches and strongly alkaline below.

These soils are used mainly for dryfarmed crops. They are also used for range and wildlife habitat.

Representative profile of Judith loam, in an area of Martinsdale-Judith loams, 1 to 5 percent slopes, in a cultivated field, 2,700 feet north and 50 feet east of the southwest corner of sec. 23, T. 36 N., R. 40 E.:

Ap—0 to 6 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; weak coarse angular blocky structure that parts to weak very fine granular; slightly hard, very friable, sticky and slightly plastic; common very fine roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

AC—6 to 10 inches, light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure; hard, friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; strongly effervescent; moderately alkaline; gradual smooth boundary.

C1ca—10 to 36 inches, light gray (10YR 7/2) clay loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; slightly hard, very friable, sticky and slightly plastic; common very fine roots to 24 inches, few extend below; many very fine tubular pores; 14 percent pebbles that have lime casts on lower sides; many soft masses of lime and common medium and fine lime concretions; violently effervescent; moderately alkaline; gradual smooth boundary.

C2—36 to 60 inches, pink (7.5YR 8/4) loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; 15 percent pebbles; common medium and fine lime concretions; violently effervescent; strongly alkaline.

The A horizon is gray or grayish brown. Between depths of 10 and 40 inches, the soil is 18 to 30 percent clay. The C horizon is from 25 to 40 percent calcium carbonate. The soil is from 3 to 20 percent gravel.

31—Judith-Martinsdale loams, 5 to 15 percent slopes. This complex is gently rolling and strongly rolling soils on uplands. About 70 percent is Judith loam, and about 20 percent is Martinsdale loam. Judith loam is on the convex knolls and ridges. Martinsdale loam is on foot slopes.

Included with these soils in mapping are some areas of Tally sandy loam on foot slopes and some areas that have a lighter colored surface layer. These inclusions make up about 10 percent of the unit.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

These soils are suited to dryfarmed wheat, oats, barley, and pasture. They are also suited to range and wildlife habitat. Capability unit IVe–3, dryland; Silty range site; Judith soil in windbreak suitability group 3L, Martinsdale soil in windbreak suitability group 2L.

Lallie series

The Lallie series consists of deep, poorly drained soils that formed in calcareous fine textured alluvium. The soils occupy oxbows, abandoned stream channels, and low terraces on flood plains along the major streams and rivers. Slopes are 0 to 2 percent. The native vegetation is mainly prairie cordgrass, bluejoint reedgrass, reed canarygrass, sedges, and some forbs.

In a representative profile the surface layer is gray silty clay about 6 inches thick. The underlying material is mottled, gray silty clay to a depth of about 28 inches and light brownish gray clay to 60 inches or more.

Permeability is slow, and the available water capacity is high. Reaction is moderately alkaline. These soils are subject to flooding and ponding from stream over-

flow and from excess irrigation water that runs off nearby irrigated fields.

These soils are mainly used for pasture, range, and wildlife habitat.

Representative profile of Lallie silty clay, in pasture, 2,300 feet north and 50 feet west of the southeast corner of sec. 14, T. 28 N., R. 39 E.:

Ap—0 to 6 inches, gray (10YR 5/1) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate very fine granular structure in upper one inch, weak medium and fine angular blocky structure below that parts to weak thin platy; very hard, firm, sticky and plastic; many very fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C1g—6 to 18 inches, gray (5Y 6/1) silty clay, dark grayish brown (2.5Y 4/2) moist; few fine and medium distinct mottles of reddish yellow (7.5YR 6/6), brown (7.5YR 4/4 and 4/2) moist; weak coarse prismatic structure that parts to weak medium and thin platy; very hard, firm, sticky and plastic; common very fine roots; slightly effervescent; moderately alkaline; gradual smooth boundary.

C2g—18 to 28 inches, gray (5Y 6/1) silty clay, dark gray (5Y 4/1) moist; fine prominent reddish yellow (7.5YR 6/8) mottles; brown (7.5YR 4/4) moist; moderate very fine angular blocky structure; very hard, firm, sticky and plastic; common very fine roots; moderately alkaline; gradual smooth boundary.

C3g—28 to 36 inches, light brownish gray (2.5Y 6/2) clay, dark gray (5Y 4/1) moist; few fine faint brownish yellow (10YR 6/6) mottles, dark grayish brown (10YR 4/2) moist; weak fine granular structure; very hard, firm, very sticky and plastic; few very fine roots; moderately alkaline; gradual smooth boundary.

C4g—36 to 60 inches, light brownish gray (2.5Y 6/2) clay, dark gray (5Y 4/1) moist; few fine faint mottles, dark grayish brown (10YR 4/2) moist; strong fine and very fine angular blocky structure; very hard, firm, very sticky and plastic; few roots; moderately alkaline.

The A horizon ranges from gray to light brownish gray. The C horizon is mainly clay or silty clay and is 35 to 60 percent clay. In some places the C horizon has thin layers of loam, clay loam, and silty clay loam. Depth to mottling is 8 to 20 inches.

32—Lallie silty clay. This nearly level soil is on oxbows abandoned stream channels, and low terraces on flood plains. Slopes are 0 to 2 percent. Included with this soil in mapping are some small areas of somewhat poorly drained soils.

Surface runoff is very slow or the soil is ponded. The hazard of wind and water erosion is slight. This soil is subject to frequent flooding from stream overflow and from excess runoff from nearby irrigated fields.

This soil is suited to pasture, range and wildlife habitat. When drained, it is also suited to irrigated wheat, barley, oats, alfalfa, and tame grass hay. Capability unit IIIw–1, irrigated; Wetland range site; windbreak suitability group 4.

Lihen series

The Lihen series consists of deep, well drained soils that formed in sandy, wind- and water-laid deposits on uplands. Slopes are 2 to 9 percent. The native vegetation is mainly prairie sandreed, little bluestem, needleandthread, western wheatgrass, and forbs.

In a representative profile the surface layer is dark grayish brown loamy fine sand about 12 inches thick. The underlying material is pale brown and light brownish gray loamy fine sand to a depth of 60 inches or more.

Permeability is rapid. The available water capacity is low. Reaction is mildly alkaline in the surface layer and moderately alkaline in the underlying material.

These soils are used mainly for range and wildlife habitat.

Representative profile of Lihen loamy fine sand, 2 to 9 percent slopes, in native grass, 2,000 feet north and 800 feet west of southeast corner of sec. 21, T. 33 N., R. 43 E.:

A1—0 to 12 inches, dark grayish brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak coarse angular blocky structure; slightly hard, very friable, slightly sticky; many fine and very fine roots; mildly alkaline; gradual smooth boundary.

C1—12 to 24 inches, pale brown (10YR 6/3) loamy fine sand, dark brown (10YR 4/3) moist; weak medium prismatic structure; slightly hard, very friable, slightly sticky; common very fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2ca—24 to 60 inches, light brownish gray (10YR 6/2) loamy fine sand, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, slightly sticky; few very fine roots; strongly effervescent; moderately alkaline.

The A horizon is grayish brown or dark grayish brown and is 6 to 15 inches thick. Depth to lime is 6 to 24 inches.

33—Lihen loamy fine sand, 2 to 9 percent slopes. This undulating and gently rolling soil is on uplands. Included with this soil in mapping are some areas where the surface layer is sandy loam. Also included are small areas of Parshall soils.

Surface runoff is slow. The hazard of wind erosion is severe, and the hazard of water erosion is slight.

This soil is suited to pasture, range, and wildlife habitat. Capability unit VIe–2, dryland; Sands range site; windbreak suitability group 4.

Lisam series

The Lisam series consists of shallow, well drained soils that formed in material weathered from clay shale. The soils occupy uplands. Clay shale bedrock is at a depth of about 12 inches. Slopes are 2 to 35 percent.

The native vegetation is mainly western wheatgrass, bluebunch wheatgrass, green needlegrass, plains muhly, prairie sandreed, forbs, and shrubs.

In a representative profile the surface layer and underlying material are gray clay that is underlain by shale at a depth of 12 inches.

Permeability is slow, and the available water capacity is very low. The reaction is mildly alkaline throughout the profile.

These soils are mainly used for range and wildlife habitat.

Representative profile of Lisam clay in an area of Thebo-Lisam clays, 2 to 15 percent slopes, in native grass, 1,400 feet west and 800 feet north of the southeast corner, sec. 1, T. 25 N., R. 38 E.:

A1—0 to 2 inches, gray (10YR 6/1) clay, very dark grayish brown (2.5Y 3/2) moist; strong very fine granular structure; hard, firm, sticky and plastic; common very fine roots; mildly alkaline; clear smooth boundary.

C1—2 to 12 inches, gray (10YR 5/1) clay, dark grayish brown (2.5Y 4/2) moist; weak medium and coarse prismatic structure parting to weak coarse angular blocky; common very fine roots; many very fine tubular pores; mildly alkaline; gradual smooth boundary.

C2r—12 to 60 inches, gray (5Y 6/1) clay shale, dark gray (5Y 4/1) moist; thin platy shales; roots bunching on top of shales; few roots extending into cracks and between shale chips in upper part.

The A1 and C1 horizons range from gray to light olive gray. The C1 horizon is 5 to 30 percent thin fragments of shale 1/4 to 1 inch in diameter. In some places, the C1 horizon has segregated lime and gypsum. The depth to the clay shale is 10 to 20 inches.

These Lisam soils differ from the established Lisam series because they are not calcareous throughout in all places. This difference does not affect their use and management.

34—Lisam-Dilts clays, 5 to 35 percent slopes. This complex consists of gently rolling to hilly soils on uplands that are dissected by intermittent streams. The Dilts soil has the profile described as representative of the Dilts series. About 45 percent of this complex is Lisam clay, and about 40 percent is Dilts clay. The soils occur in an unpredictable pattern on the landscape. In places cobbles and stones are on the surface. Small outcrops of shale are on some rounded hilltops and side slopes. In the southwestern part of the county, soft sandstone overlies clay shale, and in this area sandstone crops out on the ridgetops and upper side slopes.

Included with these soils in mapping are small areas of Thebo soils on foot slopes. Some small areas of Elloam and Sunburst soils are on ridgetops where glacial till was deposited. Also included are small areas of Vaeda soils on fans and foot slopes. Some wet and saline areas are on narrow bottoms along the intermittent streams. The soil inclusions make up about 15 percent of the unit.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

These soils are suited to range and wildlife habitat. In some areas near the Fort Peck reservoir, thin strands of ponderosa pine and junipers grow on these soils. Near the Pines Recreation Area moderately thick stands of ponderosa pine grow on these soils. Capability unit VIIe-1, dryland; Shallow Clay range site; windbreak suitability group 4.

35—Lisam-Dilts-Rock outcrop complex, 9 to 35 percent slopes. This complex consists of strongly rolling and hilly soils on uplands that are dissected by intermittent drainageways. About 30 percent is Lisam clay, 20 percent is Dilts clay, and 40 percent is Rock outcrop that is clay shale. These soils are on side slopes and foot slopes. The shale crops out on steep side slopes and rounded ridgetops. In some areas small shale outcrops occur throughout the landscape.

Included with this soil in mapping are some areas of saline Lisam soils, which are below shale outcrop. On some ridgetops, there are small areas of sandstone outcrop and Cabbart soils. These inclusions make up about 10 percent of this map unit.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

This complex is suited to range and wildlife habitat. The shale outcrop is nearly barren of vegetation. The soils that are saline produce only a sparse cover of salt-tolerant plants. Capability unit VIIe-1, dryland; Lisam and Dilts soils in Shallow Clay range site, Rock outcrop not placed in range site; Lisam and Dilts soils in windbreak suitability group 4, Rock outcrop not placed in windbreak suitability group.

Lonna series

The Lonna series consists of deep, well drained soils that formed in alluvium. The soils occupy fans and uplands. Slopes are 1 to 9 percent. The native vegetation is mainly needleandthread, western wheatgrass, green needlegrass, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and some forbs.

In a representative profile the surface layer and subsoil are light brownish gray silt loam about 11 inches thick. The underlying material is light brownish gray silty clay loam to a depth of 65 inches or more.

Permeability is moderate, and the available water capability is high. Reaction is moderately alkaline throughout.

These soils are used mainly for dryfarmed crops and some wildlife habitat.

Representative profile of Lonna silt loam, 1 to 3 percent slopes, in a cultivated area, 1,800 feet east and 300 feet south of the northwest corner of sec. 34, T. 31 N., R. 35 E.:

Ap—0 to 5 inches, light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; slightly hard, friable, sticky and slightly plastic; common very fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

B—5 to 11 inches, light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; slightly hard, friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; few fine irregu-

larly shaped soft masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

C1ca—11 to 26 inches, light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; common fine threads and soft masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—26 to 65 inches, light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, sticky and slightly plastic; few very fine roots; many very fine tubular pores; strongly effervescent; moderately alkaline.

The B horizon has weak or moderate medium prismatic structure. The B and C horizons are silt loam or silty clay loam and are 20 to 35 percent clay between depths of 10 and 40 inches. Some pedons have thin strata of loam and clay loam in the B and C horizons. The Cca horizon has few or common soft masses of lime.

36—Lonna silt loam, 1 to 3 percent slopes. This nearly level and gently sloping soil is on alluvial fans. It has the profile described as representative of the series. Included in mapping are a few small areas of Marias soils.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

This soil is suited to dryfarmed wheat, barley, oats, hay, and pasture. It is also suited to range and wildlife habitat. Capability unit IIIe–1, dryland; Silty range site; windbreak suitability group 1.

37—Lonna-Marias complex, 1 to 3 percent slopes. This complex consists of nearly level and gently sloping soils on uplands. About 50 percent is Lonna silt loam, and about 45 percent is Marias clay. They are in similar positions on the landscape.

Included with these soils in mapping are some areas of Evanston soils and a few, small areas of soils that have a clay loam surface layer. These included soils make up about 10 percent of this map unit.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

Soils in this complex are suited to dryfarmed wheat, barley, oats, hay, and pasture. They are also suited to range and wildlife habitat. Capability unit IIIe–1, dryland; windbreak suitability group 1; Lonna soil in Silty range site, Marias soil in Clayey range site.

Marias series

The Marias series consists of deep, well drained soils that formed in calcareous, fine-textured alluvium. The soils occupy uplands, fans, and terraces. Slopes range from 1 to 9 percent. The native vegetation is mainly western wheatgrass, green needlegrass, bluebunch wheatgrass, and forbs.

In a representative profile the surface layer is grayish brown clay about 6 inches thick. The underlying material is grayish brown and gray clay to a depth of 74 inches or more.

Permeability is very slow, and the available water capacity is high. Reaction is moderately alkaline throughout.

These soils are mainly used for dryfarmed crops. A few areas are used for range and wildlife habitat.

Representative profile of Marias clay, 1 to 9 percent slopes, in a cultivated field 120 feet north of center of highway, 2,000 feet west and 120 feet north of the southeast corner, sec. 7, T. 31 N., R. 35 E.:

Ap—0 to 6 inches, grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong very fine granular structure; hard, friable, sticky and very plastic; common fine roots; thin weak surface crust that forms on surface after rains and consists of adhering soil granules; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C1—6 to 11 inches, grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong coarse angular blocky structure that parts to moderate very fine angular blocky; very hard, firm, sticky and very plastic; common fine roots; common fine tubular pores; dark grayish brown (2.5Y 4/2) organic coatings on faces of peds; slightly effervescent; moderately alkaline; gradual smooth boundary.

C2—11 to 27 inches, grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; strong coarse blocky structure that parts to moderate very fine angular blocky; very hard, firm, sticky and very plastic; few fine roots; common very fine tubular pores; common slickensides with intersecting surfaces 20 to 40 degrees from horizontal; slightly effervescent; moderately alkaline; clear smooth boundary.

C3cs—27 to 74 inches, gray (5Y 5/1) clay, very dark gray (5Y 3/1) moist; moderate very coarse prismatic structure that parts to moderate very fine granular; very hard, firm, sticky and very plastic; thick slickensides on faces of prisms; many one-inch diameter masses and threads of gypsum crystals; slightly effervescent; moderately alkaline.

The A horizon is gray, grayish brown, or light brownish gray. When the soils are dry, cracks in the surface layer and upper part of the underlying material are 1 to 2 inches wide and 20 to 30 inches apart. The soil is clay or silty clay and is 45 to 60 percent clay.

38—Marias clay, 1 to 9 percent slopes. This nearly level to gently rolling soil is on uplands, fans, and terraces. It is mainly undulating and gently rolling on uplands and nearly level and gently sloping on fans and terraces. It has the profile described as representative of the series. Included with this soil in mapping are small areas of Sunburst, Lonna, Absher, and Vaeda soils.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

This soil is suited to growing dryfarmed wheat, bar-

ley, oats, hay, and pasture. It is also suited to range and wildlife habitat. Capability unit IIIe–1, dryland; Clayey range site; windbreak suitability group 1.

Marmarth series

The Marmarth series consists of moderately deep, well drained soils that formed in material weathered from soft sandstone. The soils are on uplands. Soft sandstone is at a depth of about 35 inches. Slopes are 3 to 25 percent. The native vegetation is mainly western wheatgrass, needleandthread, green needlegrass, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and some forbs.

In a representative profile the surface layer is grayish brown loam about 3 inches thick. The subsoil is 16 inches of brown, yellowish brown, and light brownish gray clay loam. The underlying material is light gray clay loam. Soft sandstone is at a depth of about 35 inches.

Permeability is moderate. The available water capacity is low or moderate. Reaction is neutral to a depth of 16 inches and mildly or moderately alkaline below.

These soils are used mainly for dryfarmed crops, range, and wildlife habitat.

Representative profile of Marmarth loam, in an area of Evanston-Marmarth loams, 3 to 12 percent slopes, in native grass, 1,000 feet west and 2,200 feet south of the northeast corner of sec. 28, T. 24 N., R. 35 E.:

A1—0 to 3 inches, grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very thin platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; neutral; clear smooth boundary.

B21t—3 to 6 inches, brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; strong medium prismatic structure; hard, firm, sticky and plastic; many very fine roots; common very fine tubular pores; many thin dark brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

B22t—6 to 16 inches, yellowish brown (10YR 5/4) clay loam, dark brown (10YR 4/3) moist; strong medium prismatic structure; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; many thin dark brown (10YR 3/3 moist) clay films on faces of peds; neutral; gradual smooth boundary.

B3—16 to 19 inches, light brownish (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; slightly hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; mildly alkaline; gradual smooth boundary.

C1ca—19 to 35 inches, light gray (2.5Y 7/2) clay loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic structure; hard, friable, sticky and plastic; common very fine roots above 25 inches, few below; many very fine tubular pores; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2r—35 to 60 inches, light yellowish brown (2.5Y 6/4) soft sandstone that rubs to sandy loam, olive brown (2.5Y 4/4) moist; moderately alkaline.

The thickness of the A and B horizon combined ranges from 12 to 20 inches. The B2t horizon is 28 to 35 percent clay. The C1 horizon is loam, clay loam, or sandy loam. Depth to soft sandstone is 20 to 40 inches.

39—Marmarth-Cabbart loams, 5 to 25 percent slopes. This complex consists of gently rolling to hilly soils on uplands. About 40 percent is Marmarth loam, and 35 percent is Cabbart loam. Marmarth loam occupies gently rolling areas and hillsides. Cabbart loam is on upper side slopes and tops of hills and ridges.

Included with these soils in mapping are areas of Delpoint loam, Evanston loam, and Hillon loam. Delpoint and Evanston soils each make up about 10 percent of the unit, and the Hollin soil makes up about 5 percent. The Delpoint soil is near Cabbart soils on side slopes and on hills and ridges. Evanston loam is on foot slopes. Hillon loam is on some hills and ridges.

Surface runoff is medium or rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

Soils in this complex are suited to range and wildlife habitat. Capability unit VIe–1, dryland; windbreak suitability group 4; Marmarth soil in Silty range site, Cabbart soil in Shallow range site.

Martinsdale series

The Martinsdale series consists of deep, well drained soils that formed in alluvium. The soils are on uplands. Slopes are 1 to 15 percent. The native vegetation is mainly western wheatgrass, needleandthread, green needlegrass, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and some forbs.

In a representative profile the surface layer is dark grayish brown loam about 5 inches thick. The subsoil is 19 inches of grayish brown and light brownish gray clay loam. The underlying material, to a depth of 60 inches or more, is light gray and pink loam that contains large amounts of carbonates.

Permeability is moderate. The available water capacity is high. Reaction is moderately alkaline throughout.

These soils are used mainly for dryfarmed crops. Some areas are used for range and wildlife habitat.

Representative profile of Martinsdale loam, 1 to 5 percent slopes, in a cultivated field, 1,800 feet west and 50 feet south of the northeast corner of sec. 29, T. 26 N., R. 41 E.:

Ap—0 to 5 inches, dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak very fine granular structure; slightly hard, very friable, sticky and slightly plastic; common very fine roots; moderately alkaline; abrupt smooth boundary.

B21t—5 to 8 inches, grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure; hard, friable, sticky and slightly plastic; common very fine roots;

many fine tubular pores; many moderately thick clay films on faces of peds; few pebbles; moderately alkaline; clear smooth boundary.

B22t—8 to 16 inches, grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure; hard, friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; many moderately thick clay films on faces of peds; few pebbles; moderately alkaline; clear smooth boundary.

B3ca—16 to 24 inches, light brownish gray (10YR 6/2) clay loam, brown (10YR 5/3) moist; weak coarse prismatic structure; slightly hard, very friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; few pebbles that have lime casts on lower sides; common medium and fine soft masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

C1ca—24 to 40 inches, light gray (10YR 7/2) loam, pale brown (10YR 6/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine hard lime concretions; violently effervescent; moderately alkaline; gradual smooth boundary.

C2—40 to 60 inches, pink (7.5YR 8/4) loam, light brown (7.5YR 6/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; few fine hard lime concretions; violently effervescent; moderately alkaline.

The A horizon is grayish brown or dark grayish brown. The thickness of the A horizon and noncalcareous part of the B horizon combined ranges from 10 to 20 inches. The B2t horizon is 30 to 35 percent clay. The Cca horizon is 25 to 40 percent calcium carbonate and 0 to 20 percent pebbles. The C horizon is 0 to 20 percent rock fragments.

40—Martinsdale loam, 1 to 5 percent slopes. This nearly level and gently sloping soil is on uplands. It has the profile described as representative of the series.

Included with this soil in mapping are small areas of Judith loam in convex parts of the landscape and along drainageways. Also, included are a few small areas of Farnuf loam and some gravelly soils on convex parts of the landscape.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

This soil is suited to growing dryfarmed wheat, barley, oats, pasture, and hay. It is also suited to range and wildlife habitat. Capability unit IIIe–2, dryland; Silty range site; windbreak suitability group 2L.

41—Martinsdale-Judith loams, 1 to 5 percent slopes. This complex consists of nearly level and undulating soils on uplands. About 50 percent is Martinsdale loam, and about 45 percent is Judith loam. The Judith soil in this complex has the profile described as representative of the Judith series. Martinsdale loam is on nearly level slopes. Judith loam is on upper slopes and in convex parts of the landscape. Included with these soils in mapping are some areas of soils that have a lighter colored surface layer, and make up about 5 percent of the map unit.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

These soils are suited to growing dryfarmed wheat, barley, oats, pasture, and hay. They are also well suited to range and wildlife habitat. Capability unit IIIe–2, dryland; Silty range site; Martinsdale soil in windbreak suitability group 2L, Judith soil in windbreak suitability group 3L.

Nishon series

The Nishon series consists of deep, somewhat poorly drained soils that formed in alluvium. The soils are in nearly level basins on glaciated uplands. Slopes are 0 to 1 percent. The native vegetation is mainly western wheatgrass, basin wildrye, green needlegrass, slender wheatgrass, sedges, and some forbs.

In a representative profile the surface layer is light gray loam about 5 inches thick. The subsoil is 40 inches of gray clay. The underlying material, to a depth of 60 inches or more, is gray clay.

Permeability is very slow. The available water capacity is high. Reaction is slightly acid to a depth of about 5 inches, neutral from 5 to 12 inches, moderately alkaline to 21 inches and strongly alkaline below.

These soils are used mainly for range, wildlife habitat, and dryfarmed crops.

Representative profile of Nishon loam, in native grass, 500 feet east and 600 feet north of the southwest corner of sec. 25, T. 30 N., R. 39 E.:

A2—0 to 5 inches, light gray (10YR 7/2) loam; common fine prominent mottles of brown (7.5YR 5/4) dry, brown (10YR 5/3) moist; strong very thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; slightly acid; abrupt smooth boundary.

B21tg—5 to 12 inches, gray (5Y 6/1) clay, olive gray (5Y 4/2) moist; strong medium columnar structure; very hard, very firm, sticky and very plastic; common very fine roots; many fine tubular pores; continuous moderately thick clay films on faces of peds; neutral; gradual smooth boundary.

B22tg—12 to 21 inches, gray (5Y 6/1) clay, olive gray (5Y 4/2) moist; moderate coarse angular blocky structure; very hard, very firm, sticky and very plastic; common very fine roots; many fine tubular pores; many moderately thick clay films on faces of peds; moderately alkaline; gradual smooth boundary.

B3cag—21 to 45 inches, gray (5Y 6/1) clay, olive gray (5Y 4/2) moist; weak coarse angular blocky structure, very hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; common fine soft masses of lime; slightly effervescent; strongly alkaline; gradual smooth boundary.

Ccag—45 to 60 inches, gray (5Y 6/1) clay, dark

grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few fine irregular shaped soft masses of lime; strongly effervescent; strongly alkaline.

In native grass, the A horizon ranges from 3 to 12 inches in thickness. It is gray, light gray, or light brownish gray. The B horizon is 45 to 60 percent clay.

42—Nishon loam. This nearly level soil is on small basins on glaciated uplands. Slopes are 0 to 1 percent.

Included with this soil in mapping are some areas that have a clay loam surface layer if it is cultivated. Where the soil is mapped near Marias clay, it also has a clay surface layer. Also included are some small areas of poorly drained soils near the center of mapped areas.

Surface runoff is very slow or ponded. The soil is ponded for short periods during spring months in most years. The hazard of wind and water erosion is slight.

This soil is suited to growing dryfarmed wheat, barley, oats, hay, and pasture. It is also suited to range and wildlife habitat. Capability unit IIIw–2, dryland; Overflow range site; windbreak suitability group 3S.

Nobe series

The Nobe series consists of deep, moderately well drained soils that formed in alluvium and glacial till. The soils occupy glaciated uplands and fans and terraces in valleys. Slopes are 0 to 5 percent. The native vegetation is mainly Nuttall saltbush, western wheatgrass, alkali sacaton, saltgrass, Sandberg bluegrass, and greasewood.

In a representative profile the surface layer is light gray loam about 2 inches thick. The subsoil is 2 inches of pale brown clay. The underlying material is strongly saline, pale brown and light brownish gray silty clay loam and clay to a depth of 60 inches or more.

Permeability is very slow. The available water capacity is low or very low because of the high salt content. Reaction is moderately and strongly alkaline to a depth of 40 inches and moderately alkaline below.

These soils are used mainly for range and wildlife habitat.

Representative profile of Nobe clay, in an area of Nobe-Absher complex, 0 to 3 percent slopes, in native grass east of road, 1,000 feet west and 150 feet north of the southeast corner of sec. 35, T. 29 N., R. 34 E.:

A2—0 to 2 inches, light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; moderate thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; moderately alkaline; abrupt smooth boundary.

B2t—2 to 4 inches, pale brown (10YR 6/3) clay, dark brown (10YR 4/3) moist; strong medium columnar structure that parts to strong medium angular blocky; very hard, firm, sticky and plastic; common very fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds; strongly alkaline; clear smooth boundary.

C1sa—4 to 40 inches, pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; weak medium prismatic structure that parts to weak fine granular; hard, firm, sticky and plastic; common very fine roots to 20 inches, few below that depth; common fine tubular pores; common seams and masses of salts; strongly effervescent; strongly alkaline; gradual smooth boundary.

C2cs—40 to 60 inches, light brownish gray (2.5Y 6/2) clay; dark grayish brown (2.5Y 4/2) moist; common fine distinct mottles of olive gray (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; common seams and masses of gypsum and other salts; strongly effervescent; moderately alkaline.

Thickness of the A2 horizon ranges from ½ inch to 3 inches and thickness of B2t horizon ranges from 1 to 3 inches. The depth to the horizon of salt concentration is 1 to 6 inches.

The soil below the A2 horizon is from 35 to 50 percent clay. The C horizon has common to many seams and masses of gypsum and other salts.

43—Nobe clay. This nearly level and gently sloping soil is on fans at the base of clay shale uplands. Slopes are 0 to 4 percent. In some places an accumulation of salts is on the surface. Included with this soil in mapping are small areas of Vaeda and Nobe soils that have clay shale at depths of 36 to 60 inches.

Surface runoff is medium to rapid. The hazard of wind erosion is slight, and the hazard of water erosion is moderate.

This soil is suited to range and wildlife habitat. It produces a sparse cover of salt-tolerant vegetation. Capability unit VIIs–1, dryland; Saline Upland range site; windbreak suitability group 4.

44—Nobe-Absher complex, 0 to 3 percent slopes. This complex consists of nearly level and gently sloping soils on fans and terraces on uplands and in valleys. About 50 percent is Nobe clay, and about 40 percent is Absher clay loam. The Nobe soil in this complex has the profile described as representative of the Nobe series. An individual area of each soil is small; it measures several feet in diameter. Nobe clay occupies small, nearly barren, slightly raised areas and has high salt concentrations. Absher clay loam is in small, slightly concave parts of the landscape. It is between areas of the Nobe soil. Included with these soils in mapping are areas of Vaeda soils that make up about 10 percent of the map unit.

Surface runoff is slow or medium. The hazard of wind erosion is moderate, and the hazard of water erosion is slight.

Soils in this complex are suited to range and wildlife habitat. Capability unit VIIs–1, dryland; Nobe soil in Saline Upland range site, Absher soil in Dense Clay range site; Nobe soil in windbreak suitability group 4, Absher soil in windbreak suitability group 3S.

Parshall series

The Parshall series consists of deep, well drained soils that formed in moderately coarse textured, wind- and water-laid deposits on uplands. Slopes are 1 to 5 percent. The native vegetation is mainly needleandthread, prairie sandreed, little bluestem, western wheatgrass, blue grama, threadleaf sedge, and forbs.

In a representative profile the surface layer is grayish brown and dark gray sandy loam about 20 inches thick. The subsoil is 12 inches of grayish brown sandy loam. The underlying material, to a depth of 40 inches, is grayish brown sandy loam. Below that it is light gray sandy loam to a depth of 60 inches or more.

Permeability is moderately rapid. The available water capacity is moderate. Reaction is mildly alkaline to a depth of 32 inches and moderately alkaline below.

These soils are used for dryland farming and pasture. Some areas are used for range and wildlife habitat.

Representative profile of Parshall sandy loam, 1 to 5 percent slopes, in a pasture, 1,100 feet east and 700 feet north of southwest corner, sec. 12, T. 27 N., R. 40 E.:

Ap—0 to 6 inches, grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; mildly alkaline; abrupt smooth boundary.

A12—6 to 12 inches; dark gray (10YR 4/1) sandy loam, very dark brown (10YR 2/2) moist; weak coarse prismatic structure; hard, very friable, slightly sticky and slightly plastic; common very fine roots; common fine tubular pores; mildly alkaline; gradual smooth boundary.

A13—12 to 20 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; hard, very friable, slightly sticky and slightly plastic; common very fine roots; common fine tubular pores; mildly alkaline; gradual smooth boundary.

B2—20 to 32 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; hard, very friable, slightly sticky and slightly plastic; common very fine roots; common fine tubular pores; mildly alkaline; gradual smooth boundary.

C1—32 to 40 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common fine tubular pores; moderately alkaline; clear smooth boundary.

C2ca—40 to 60 inches; light gray (2.5Y 7/2) sandy loam, grayish brown (2.5Y 5/2) moist; massive; hard, very friable, slightly sticky and slightly plastic; few very fine roots; many fine tubular pores; common fine spots of lime; violently effervescent; moderately alkaline.

The A horizon ranges from 16 to 36 inches in thickness. The depth to lime is 20 to 45 inches.

45—Parshall sandy loam, 1 to 5 percent slopes. This nearly level and undulating soil is on uplands.

Included with this soil in mapping are a few areas of soils that have a loamy sand surface layer and some that have clay loam glacial till at depths of 20 to 40 inches. Also included are small areas of Lihen loamy sand in convex parts of the landscape and Williams soils in some smooth, gently sloping parts. Also included are some small, closed depressions where soils are somewhat poorly drained and poorly drained.

Surface runoff is slow or medium. The hazard of wind erosion is severe, and hazard of water erosion is slight.

This soil is suited to growing dryfarmed wheat, barley, oats, hay, and pasture. It is also suited to range and wildlife habitat. Capability unit IVe–1, dryland; Sandy range site; windbreak suitability group 2M.

Phillips series

The Phillips series consists of deep, well drained soils that formed in glacial till. The soils are on glaciated uplands. Slopes are 0 to 9 percent. The native vegetation is mainly western wheatgrass, needleandthread, green needlegrass, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and forbs.

In a representative profile the surface layer is pale brown loam about three inches thick. The subsurface layer is light brownish gray loam about two inches thick. The subsoil is 31 inches of brown and light brownish gray clay and clay loam. The underlying material is light brownish gray heavy clay loam to a depth of 60 inches or more.

Permeability is slow, and the available water capacity is high. Reaction is neutral to a depth of about 5 inches, mildly alkaline to a depth of 12 inches, and moderately alkaline below.

These soils are used mainly for dryfarmed crops, pasture, range, and wildlife habitat.

Representative profile of Phillips loam, 0 to 5 percent slopes, in native grass, 300 feet north and 300 feet west of the southeast corner of sec. 26, T. 30 N., R. 38 E.:

A1—0 to 3 inches, pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; moderate very thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many roots; many very fine pores; 1 percent pebbles; many unstained silt and sand grains; neutral; clear smooth boundary.

A2—3 to 5 inches, light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate very thin platy structure; hard, friable, sticky and slightly plastic; many very fine roots; many very fine tubular pores; 1 percent pebbles; many unstained silt and sand grains; neutral; abrupt smooth boundary.

B2t—5 to 12 inches, brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong medium prismatic structure parting to strong medium angular blocky; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; continuous moderately thick dark grayish brown (10YR 4/2) clay films on faces of

peds; mildly alkaline; clear smooth boundary.

B3tca—12 to 36 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; common thin clay films on vertical faces of peds; 1 percent pebbles; common medium soft masses of white (2.5Y 8/2) lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C1ca—36 to 50 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few very fine roots; 1 percent pebbles; common medium soft masses of lime; strongly effervescent; moderately alkaline; diffuse smooth boundary.

C2—50 to 60 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; 1 percent pebbles; common fine soft masses of salt below 55 inches; strongly effervescent; moderately alkaline.

The thickness of the A horizon and noncalcareous part of the Bt horizon combined ranges from 10 to 20 inches. The B2t horizon is clay loam or clay that is 35 to 45 percent clay. It ranges from brown to grayish brown. The soil is 1 to 8 percent pebbles.

46—Phillips loam, 0 to 5 percent slopes. This nearly level and undulating soil is on glaciated uplands. It has the profile described as representative of the series.

Included with this soil in mapping are a few small, cultivated areas that have a clay loam surface layer; small areas of Scobey, Thoeny, and Elloam soils; and a few small areas of Nishon soils in closed depressions.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

This soil is suited to growing dryfarmed wheat, barley, oats, pasture, and hay. It is also suited to range and wildlife habitat. Capability unit IIIe–1, dryland; Silty range site; windbreak suitability group 1.

47—Phillips-Elloam complex, 1 to 9 percent slopes. This complex consists of nearly level to gently rolling soils on glaciated uplands. A few areas of these soils occur on alluvial fans and terraces. About 50 percent is Phillips loam, about 25 percent is Elloam clay loam, and about 15 percent is Thoeny loam.

Included with these soils in mapping are areas of Scobey, Sunburst, and Nobe soils. A few small areas of Nishon soils in closed depressions are also included. In the southwest part of the county the included soils have soft sandstone at depths of 40 to 60 inches. In this part of the county, Cabbart and Delpoint soils are inclusions. These included soils make up about 10 percent of this map unit.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

Soils in this complex are suited to growing dryfarmed wheat, barley, and oats. They are also suited to range and wildlife habitat. Capability unit IVe–2, dryland; Phillips soils in Silty range site, Elloam soil in Dense Clay range site; Phillips soil in windbreak suitability group 1, Elloam soil in windbreak suitability group 3S.

48—Phillips-Nobe-Absher complex, 1 to 5 percent slopes. This complex consists of nearly level and gently sloping soils on fans, terraces, and glaciated uplands. The Phillips soil has a profile similar to the one described as representative of the series, except it is more saline in the underlying material. About 40 percent of the acreage is Phillips loam, about 20 percent Nobe clay, about 20 percent Absher clay loam, and 15 percent is Thoeny loam. The soils occur in a complex pattern on the landscape. Individual areas of each soil are small, measuring several feet in diameter. Included with these soils in mapping are areas of Vaeda soils that make up 5 percent of the unit.

Surface runoff is slow or medium, and the hazard of wind and water erosion is moderate.

Soils in this complex are suited to range and wildlife habitat. Capability unit VIs–1, dryland; Phillips soil in Silty range site, Nobe soil in Saline Upland range site, and Absher soil in Dense Clay range site; Phillips soil in windbreak suitability group 1, Nobe soil in windbreak suitability group 4, Absher soil in windbreak suitability group 3S.

49—Phillips-Scobey complex, 2 to 9 percent slopes. This complex consists of undulating and gently rolling soils on glaciated uplands. About 50 percent is Phillips loam, and about 30 percent is Scobey clay loam. Phillips loam is on the lower side slopes and in concave parts of the landscape. Scobey soils are on upper side slopes and convex parts.

Included with these soils in mapping are areas of Sunburst, Elloam, and Thoeny soils. Sunburst soils are on tops of ridges and knolls. Elloam and Thoeny soils are near the Phillips soil. In some small areas the soils are gravelly and are on the knolls and ridges. Some small areas of Nishon soils are in closed depressions. The Nishon soils are wet after snow melts and heavy rains. These included soils make up about 20 percent of this map unit.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

Soils in this complex are suited to dryfarmed wheat, barley, oats, hay, and pasture. They are also suited to range and wildlife habitat. Capability unit IIIe–1, dryland; Silty range site; windbreak suitability group 1.

50—Phillips-Telstad loams, 2 to 9 percent slopes. This complex consists of undulating and gently rolling soils on glaciated uplands. About 50 percent is Phillips loam, and about 40 percent is Telstad loam. Phillips loam is on the lower part of side slopes and in concave parts of the landscape. Telstad loam occupies the convex parts of the landscape.

Included with these soils in mapping are areas of Elloam, Scobey, and Thoeny soils. Also included are a few small areas of Nishon soils that are in closed depressions. These included soils make up about 10 percent of this map unit.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

Soils in this complex are suited to dryfarmed wheat, barley, oats, hay, and pasture. They are also suited to range and wildlife habitat. Capability unit IIIe–1, dry-

land; Silty range site; windbreak suitability group 1.

51—Phillips-Thoeny loams, 0 to 2 percent slopes. This complex consists of nearly level soils on uplands. The Thoeny soil has a profile similar to the one described as representative of the Thoeny series, except that it has a loam surface layer. About 70 percent of the map unit is Phillips loam, and about 25 percent is Thoeny loam. The size of individual soil areas is small.

Included with these soils in mapping are some areas of Absher soils and a few small areas of soils that are underlain by very gravelly materials at a depth of 20 to 40 inches. These included soils made up about 5 percent of this map unit.

Surface runoff is slow. The hazard of wind erosion is moderate, and the hazard of water erosion is slight.

Soils in this complex are suited to dryfarmed wheat, barley, oats, hay, and pasture. They are also suited to range and wildlife habitat. Capability unit IIIs–3, dryland; Phillips soil in Silty range site, Thoeny soil in Dense Clay range site; Phillips soil in windbreak suitability group 1, Thoeny soil in windbreak suitability group 3S.

Redvale series

The Redvale series consists of deep, well drained soils that formed in alluvium. The soils occupy fans and terraces. Very gravelly loamy sand is at a depth of about 30 inches. Slopes are 0 to 3 percent. The native vegetation is mainly western wheatgrass, needlandthread, green needlegrass, bluebunch wheatgrass, prairie junegrass, Sandberg bluegrass, and forbs.

In a representative profile the surface layer is light brownish gray loam about 6 inches thick. The subsoil is 24 inches thick. The upper 5 inches is pale brown clay loam. The middle nine inches is brown clay, and the lower 10 inches is light brownish gray gravelly clay loam. The underlying material to a depth of 60 inches or more is pale brown extremely gravelly loamy sand.

Permeability is slow to a depth of about 30 inches and rapid or very rapid below. The available water capacity is low. Reaction is neutral to a depth of 20 inches and moderately alkaline below.

These soils are used mainly for dryfarmed crops, pasture, range, and wildlife habitat.

Representative profile of Redvale loam, 0 to 3 percent slopes, in a pasture, 1,200 feet north and 2,300 feet west of the southeast corner of sec. 18, T. 30 N., R 39 E.:

Ap—0 to 6 inches, light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak very thin platy structure; hard, friable, sticky and slightly plastic; common very fine roots; neutral; abrupt smooth boundary.

B21t—6 to 11 inches, pale brown (10YR 6/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure that parts to weak medium blocky; hard, friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; common thin clay films on faces of peds; neutral; abrupt smooth boundary.

B22t—11 to 20 inches, brown (10YR 5/3) clay, dark grayish brown (2.5Y 4/2) moist; strong medium prismatic structure; very hard, firm, sticky and plastic; common very fine roots; few very fine tubular pores; continuous thick very dark grayish brown (10YR 3/2) moist clay films on faces of peds; neutral; clear smooth boundary.

B3ca—20 to 30 inches, light brownish gray (2.5Y 6/2) gravelly clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; hard, firm, sticky and plastic; common very fine roots; common very fine tubular pores; 25 percent pebbles; lime casts on lower sides of pebbles; many distinct medium and fine white (2.5Y 8/2) soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

IIC2—30 to 60 inches, pale brown (10YR 6/3) extremely gravelly loamy sand, dark brown (10YR 4/3) moist; single grained; loose, slightly sticky; few very fine roots; 70 percent pebbles; thin lime casts of lower sides of pebbles; strongly effervescent; moderately alkaline.

The A1 horizon is light brownish gray or pale brown. The B2t horizon is clay or clay loam that is 35 to 45 percent clay. The upper part of the C horizon is 25 to 35 percent gravel, and the lower part is 60 to 75 percent gravel. It is extremely gravelly loamy sand or extremely gravelly sand. Depth to the extremely gravelly IIC horizon is 20 to 40 inches.

52—Redvale loam, 0 to 3 percent slopes. This nearly level and gently sloping soil is on stream terraces and fans. Included in mapping are a few small areas of Attewan soils and soils that are not extremely gravelly within a depth of 40 inches.

Surface runoff is slow. The hazard of wind erosion is moderate, and the hazard of water erosion is slight.

This soil is suited to dryfarmed wheat, barley, oats, pasture, and hay. It is also suited to range and wildlife habitat. Capability unit IIIs–3, dryland; Silty range site; windbreak suitability group 3M.

Reeder series

The Reeder series consists of moderately deep, well drained soils that formed in material weathered from sandstone. The soils are on uplands. Soft sandstone is at a depth of about 26 inches. Slopes are 2 to 15 percent. The native vegetation is mainly western wheatgrass, green needlegrass, needleandthread, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and some forbs.

In a representative profile the surface layer is dark grayish brown loam about 3 inches thick. The subsoil extends to a depth of 12 inches. The upper 5 inches is brown clay loam. The lower 4 inches is pale brown loam. The underlying material to a depth of 26 inches is very pale brown loam. Below this it is soft sandstone.

Permeability is moderate. The available water capacity is moderate. Reaction is mildly alkaline in the surface layer and upper subsoil, moderately alkaline in the

lower subsoil, and strongly alkaline in the underlying material.

These soils are used mainly for range and wildlife habitat. Some areas are used for dryfarmed crops.

Representative profile of Reeder loam in an area of Reeder-Doney-Cambert complex, 9 to 35 percent slopes, in native grass, 1,500 feet north and 300 feet east of the southwest corner of sec. 2, T. 35 N., R. 40 E.:

A1—0 to 3 inches, dark grayish (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate very thin platy structure that parts to moderate very fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; mildly alkaline; clear smooth boundary.

B21t—3 to 8 inches, brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure; hard, friable, sticky and slightly plastic; many very fine roots; few very fine tubular pores; many moderately thick very dark grayish brown (10YR 3/2 moist) clay films on faces of peds; mildly alkaline; clear smooth boundary.

B22tca—8 to 12 inches, pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; weak medium prismatic structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine tubular pores; few thin dark brown (10YR 4/3) moist, clay films on faces of peds; common fine soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C1ca—12 to 26 inches, very pale brown (10YR 7/4) loam, light yellowish brown (10YR 6/4) moist; weak coarse prismatic structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; common fine soft masses of lime; violently effervescent; strongly alkaline; gradual smooth boundary.

C2r—26 to 60 inches, pale yellow (2.5Y 7/4) soft sandstone that rubs to a sandy loam, light olive brown (2.5Y 5/4) moist; common large brownish yellow (10YR 6/6) stains; strongly effervescent; moderately alkaline.

The thickness of the A horizon and noncalcareous part of the B horizon combined ranges from 6 to 12 inches. The B2t horizon is 30 to 35 percent clay. The C horizon is loam, clay loam, or sandy loam.

53—Reeder-Cambert-Doney complex, 2 to 9 percent slopes. This complex consists of undulating and gently rolling soils on uplands. About 40 percent is Reeder loam, 30 percent Cambert silt loam, and about 20 percent Doney loam. The Doney soil has the profile described as representative of the Doney series. Reeder loam is on side slopes and foot slopes. Cambert silt loam and Doney loam are mainly on upper slopes of 4 to 9 percent and on convex parts of the landscape.

Included with this soil in mapping are small areas of soils that have a sandy loam surface layer and underlying material. Also included are Farnuf soils on foot slopes and short fans, some small areas of clay loam and clay soils on foot slopes, and small areas of sandstone outcrop on knolls and ridges. The inclusions make up about 10 percent of the unit.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

Soils in this complex are suited to dryfarmed wheat, barley, oats, and pasture. They are also suited to range and wildlife habitat. Capability unit IVe–3, dryland; Silty range site; windbreak suitability group 2M.

54—Reeder-Doney-Cambert complex, 9 to 35 percent slopes. This complex consists of strongly rolling and hilly soils on uplands that are dissected by intermittent stream valleys. The Reeder and Cambert soils in this complex have the profiles described as representative of their series. About 40 percent is Cambert silt loam. Reeder loam is on side slopes and foot slopes of less than 15 percent gradient. Doney loam is on upper slopes and convex parts of the landscape. Cambert silt loam has slopes of less than 25 percent.

Included with this soil in mapping are areas of Tinsley soils at the top of some slopes, small areas of sandstone outcrop on ridgetops and at the top of slopes, and small areas of clay soils on foot slopes. These inclusions make up about 10 percent of the unit.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

Soils in this complex are suited to range and wildlife habitat. Capability unit VIe–1, dryland; Cambert and Doney soils in Thin Hilly range site, Reeder soil in Silty range site; Cambert and Doney soils in windbreak suitability group 4, Reeder soil in windbreak suitability group 2M.

Rivra series

The Rivra series consists of deep, well drained soils that formed in gravelly alluvium. The soils are on flood plains and terraces in valleys. Slopes are 0 to 2 percent. The native vegetation is mainly needleandthread, western wheatgrass, bluebunch wheatgrass, blue grama, prairie junegrass, and forbs.

In a representative profile the surface layer is grayish brown clay loam about 5 inches thick. The underlying material to a depth of 12 inches is light brownish gray gravelly loam. Below that it is light brownish gray extremely gravelly loamy sand to a depth of 60 inches or more.

Permeability is rapid or very rapid. The available water capacity is very low. The reaction is mildly alkaline in the upper 5 inches and moderately alkaline below.

These soils are used mainly for range and wildlife habitat.

Representative profile of Rivra clay loam in an area of Havre-Rivra complex, in native grass, 1,600 feet north and 200 feet west of the southeast corner of sec. 31, T. 31 N., R. 41 E.:

A1—0 to 5 inches, grayish brown (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate thin platy structure in the upper one inch and weak medium angular blocky structure below; hard, friable, sticky and slightly plastic; many very

fine roots; few pebbles; mildly alkaline; clear smooth boundary.

C1ca—5 to 12 inches, light brownish gray (2.5Y 6/2) gravelly loam, dark grayish brown (2.5Y 4/2) moist; weak coarse angular blocky structure; hard, friable, sticky and slightly plastic; many very fine roots; common very fine tubular pores; 30 percent pebbles that have thin lime casts on lower sides; few fine soft masses and common fine distinct seams of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

IIC2—12 to 60 inches, light brownish gray (2.5Y 6/2) extremely gravelly loamy sand, dark grayish brown (2.5Y 4/2) moist; single grained; loose, slightly sticky and nonplastic; common roots to 30 inches, few extend below; 75 percent pebbles and cobbles; lime casts on lower sides of fragments; moderately alkaline.

The depth to the contrasting underlying layer is 8 to 20 inches. The IIC horizon ranges from very gravelly loamy sand to very gravelly sand. The C horizon is from 50 to 75 percent gravel and cobbles between depths of 10 and 60 inches.

Rock outcrop

55—Rock outcrop. These are miscellaneous areas that consist of strongly rolling to steep shale uplands dissected by intermittent stream valleys. Barren, rounded shale ridges that have moderately steep side slopes and narrow, saline and alkaline valleys are the typical landscape features. Local relief is 25 to 300 feet. About 80 percent of the area is outcrops of shale bedrock. The included soils represent about 20 percent of the unit and consist of Lisam soils, silty clay soils, and saline soils.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

This area is not suited to even limited grazing. It is used to a limited extent as habitat for wildlife. Capability unit VIII.

Savage series

The Savage series consists of deep, well drained soils that formed in alluvium on fans and terraces. Slopes are 0 to 3 percent. The native vegetation is mainly western wheatgrass, green needlegrass, needleandthread, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and forbs.

In a representative profile the surface layer is grayish brown clay loam about 7 inches thick. The subsoil extends to a depth of 21 inches. The upper 9 inches is grayish brown silty clay. The lower 5 inches is light brownish gray silty clay loam. The underlying material, to a depth of 50 inches, is grayish brown and light brownish gray silty clay loam. Below that it is grayish brown very gravelly loam to a depth of 60 inches or more.

Permeability is slow. The available water capacity is high. Reaction is neutral to a depth of about 7 inches and moderately alkaline below.

These soils are used mainly for dryfarmed crops, range, and wildlife habitat.

Representative profile of Savage clay loam, 0 to 3 percent slopes, in a cultivated field, 1,350 feet west and 250 feet south of the northeast corner of sec. 11, T. 37 N., R. 41 E.:

Ap—0 to 7 inches, grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse angular blocky structure; slightly hard, friable, sticky and slightly plastic; common very fine roots; neutral; abrupt smooth boundary.

B2t—7 to 16 inches, grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; strong medium prismatic structure that parts to strong medium angular blocky; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; continuous moderately thick very dark grayish brown (10YR 3/2) clay films on faces of peds; moderately alkaline; gradual smooth boundary.

B3tca—16 to 21 inches, light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure; hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; common thin clay films on faces of peds; strongly effervescent; moderately alkaline; gradual smooth boundary.

C1ca—21 to 40 inches, light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak coarse angular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; many very fine tubular pores; common fine soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2ca—40 to 50 inches, grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, sticky and slightly plastic; few very fine roots; many very fine tubular pores; common fine soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

IIC3—50 to 60 inches, grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; 50 percent pebbles; strongly effervescent; moderately alkaline.

The A horizon is grayish brown or dark grayish brown. Bleached silt and sand are on peds and structure faces in the A horizon and upper part of the B horizon in some profiles. The B2t horizon is heavy silty clay loam, heavy clay loam, or silty clay. The C horizon is clay loam or silty clay loam. Depth to very gravelly material is 40 inches or more.

56—Savage clay loam, 0 to 3 percent slopes. This

nearly level and gently sloping soil is on alluvial fans and stream terraces. Included with this soil in mapping are some small areas of soils that are 30 to 40 inches deep to very gravelly loamy sand, small areas of Farnuf and Turner soils, and a few small areas of saline and alkali soils.

Surface runoff is slow. The hazard of wind erosion is moderate, and the hazard of water erosion is slight.

This soil is suited to dryfarmed wheat, barley, oats, pasture, and hay. It is also suited to range and wildlife habitat. Capability unit IIIs–3, dryland; Silty range site; windbreak suitability group 1.

Scobey series

The Scobey series consists of deep, well drained soils that formed in glacial till. The soils are on glaciated uplands. Slopes are 1 to 15 percent. The native vegetation is mainly western wheatgrass, green needlegrass, needleandthread, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and some forbs.

In a representative profile the surface layer is grayish brown clay loam about 5 inches thick. The subsoil is 10 inches of brown and grayish brown clay loam. The underlying material, to a depth of 60 inches or more, is light brownish gray clay loam.

Permeability is moderately slow to a depth of about 15 inches and slow below. The available water capacity is high. Reaction is mildly alkaline to a depth of about 11 inches, moderately alkaline to a depth of 36 inches, and moderately alkaline or strongly alkaline below that depth.

These soils are mainly used for dryfarmed crops, range, and wildlife habitat.

Representative profile of Scobey clay loam, 1 to 9 percent slopes, in a cultivated field, 500 feet east and 100 feet south of the northwest corner of sec. 24, T. 26 N., R. 40 E.:

Ap—0 to 5 inches, grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure that parts to weak very fine granular; slightly hard, friable, sticky and plastic; common very fine roots; 2 percent pebbles and cobble size fragments; mildly alkaline; abrupt smooth boundary.

B2t—5 to 11 inches, brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; strong medium prismatic structure; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; continuous moderately thick very dark grayish brown (10YR 3/2 moist) clay films on faces of peds; 2 percent pebbles and cobble size fragments; mildly alkaline; clear smooth boundary.

B3tca—11 to 15 inches, grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; common thin clay films on faces of peds; 2 percent pebbles and cobble size fragments; common medium irregularly shaped white (2.5Y 8/1) soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—15 to 36 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; hard, firm, sticky and plastic; common very fine roots; many very fine tubular pores; 2 percent pebbles and cobble size fragments; many medium irregularly shaped white (2.5Y 8/2) soft masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

C2—36 to 50 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few very fine roots; many very fine tubular pores; 2 percent pebbles and cobble size fragments; strongly effervescent; strongly alkaline; gradual smooth boundary.

C3cs—50 to 60 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few very fine roots; 2 percent pebbles and cobble size fragments; common seams and masses of gypsum; strongly effervescent; moderately alkaline.

The A horizon is grayish brown or brown. In native grass, the A horizon is loam and is 3 or 4 inches thick. The B2t horizon is 35 to 45 percent clay. The thickness of the A horizon and noncalcareous part of the B horizon combined ranges from 6 to 15 inches. The soil is 1 to 8 percent pebbles and cobbles.

57—Scobey clay loam, 1 to 9 percent slopes. This nearly level to gently rolling soil is on uplands. It has the profile described as representative of the series.

Included with this soil in mapping are small areas of Phillips soils in concave parts of the landscape and at the heads of drainageways. Also included are small areas of Sunburst soils on convex knolls. In places, the surface layer is gravelly or cobbly. Also included are a few small areas of Nishon soils that are in closed depressions.

Surface runoff is medium. The hazard of water and wind erosion is moderate.

This soil is suited to dryfarmed wheat, barley, oats, pasture, and hay. It is also suited to range and wildlife habitat. Capability unit IIIe–1, dryland; Silty range site; windbreak suitability group 1.

58—Scobey stony clay loam, 2 to 15 percent slopes. This undulating to strongly rolling soil is on glaciated uplands. It has a profile similar to that described as representative of the series, except that it is cobbly and stony throughout in most places. Stones occupy 0.1 to 15 percent of the surface on much of the landscape. Greater amounts of cobble and stone are on convex parts of the landscape. Stones occupy 3 to 15 percent of most ridgetops.

Included with these soils in mapping are some small areas of Sunburst soils on convex parts of the landscape and some small areas of Philips soils in concave parts.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

This soil is suited to range and wildlife habitat. Capability unit VIs-2, dryland; Silty range site; windbreak suitability group 4.

59—Scobey-Sunburst clay loams, 5 to 25 percent slopes. This complex consists of gently rolling to hilly soils on uplands. About 50 percent is Scobey clay loam, and 30 percent is Sunburst clay loam. The Scobey soil is mainly on side slopes and smooth, broad, rounded knolls where slopes are less than 15 percent. The Sunburst soil is on ridgetops and steeper side slopes.

Included with these soils in mapping are areas of Phillips, Elloam, Hillon, Telstad, and Thebo soils and small areas that have a gravelly or cobbly surface layer. These included soils make up about 20 percent of the unit.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

These soils are suited to range and wildlife habitat. Capability unit VIe-1, dryland; Scobey soil in Silty range site, Sunburst soil in Thin Hilly range site; Scobey soil in windbreak suitability group 1, Sunburst soil in windbreak suitability group 4.

Sunburst series

The Sunburst series consists of deep, well drained soils that formed in glacial till. The soils occupy convex parts of uplands and the upper part of valley side slopes. Slopes are 5 to 35 percent. The native vegetation is mainly bluebunch wheatgrass, western wheatgrass, little bluestem, needleandthread, and some forbs.

In a representative profile the surface layer is grayish brown clay loam about 4 inches thick. The underlying material is grayish brown and light brownish gray clay loam to a depth of 60 inches or more.

Permeability is slow, and the available water capacity is high. Reaction is moderately alkaline throughout the profile.

These soils are used for range and wildlife habitat.

Representative profile of Sunburst clay loam, 9 to 35 percent slopes, in range, 150 feet east and 1,800 feet south of the northwest corner of sec. 5, T. 27 N., R. 40 E.:

A1—0 to 4 inches, grayish brown (10YR 5/2) clay loam, dark brown (10YR 4/3) moist; weak thin platy structure that parts to moderate very fine granular; slightly hard, friable, sticky and plastic; many fine roots; 3 percent pebbles; slightly effervescent from 0 to 2 inches and strongly effervescent below; moderately alkaline; clear smooth boundary.

C1—4 to 10 inches, grayish brown (10YR 5/2) clay loam, dark brown (10YR 4/3) moist; weak medium prismatic structure that parts to moderate fine and very fine granular; slightly hard, friable, sticky and plastic; many very fine roots; many very fine tubular pores; 3 percent pebbles that have lime casts on lower sides; strongly effervescent; moderately alkaline; clear smooth boundary.

C2ca—10 to 28 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; 3 percent pebbles that have lime casts on lower sides; few fine threads and seams of salt; common medium soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3cs—28 to 36 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; common very fine roots; common very fine tubular pores; 3 percent pebbles; few fine threads and seams of gypsum; strongly effervescent; moderately alkaline; gradual smooth boundary.

C4cs—36 to 60 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few roots; 3 percent pebbles; common fine and medium nests and masses of gypsum; strongly effervescent; moderately alkaline.

The soil is 2 to 15 percent pebbles and cobbles throughout. The A horizon is grayish brown, light brownish gray, or pale brown. The C horizon has few to many seams and soft masses of lime in the upper part. It has few to many seams and masses of gypsum and other salts in the lower part. The 10- to 40-inch control section is heavy clay loam or clay that is 35 to 45 percent clay.

60—Sunburst clay loam, 9 to 35 percent slopes. This strongly rolling and hilly soil is on glaciated uplands and sides of valleys. It has the profile described as representative of the series.

Included with this soil in mapping are some areas that have a gravelly surface layer and a few small areas of Scobey, Hillon, Cabbart, Lisam, Thebo, and Tinsley soils. In some areas Phillips and Elloam soils are on lower side slopes and foot slopes. Also included are a few small areas of alluvial soils along streams and on foot slopes.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

This soil is suited to range and wildlife habitat. Capabilty unit VIe-1, dryland; Thin Hilly range site; windbreak suitability group 4.

61—Sunburst-Lisam complex, 9 to 35 percent slopes. This complex consists of strongly rolling and hilly soils on uplands. It mainly occurs along the edge of glaciated uplands above intermittent stream valleys. On the upper slopes, soils formed in glacial till. On the lower slopes, soils formed in material weathered from shale. About 40 percent of the map unit is Sunburst clay loam, about 35 percent is Lisam clay, and about 10 percent is Thebo clay. Sunburst soils are on upper slopes and ridgetops. In some places, they have a gravelly surface layer. Lisam and Thebo soils are on lower slopes and foot slopes.

Included with these soils in mapping are areas of Elloam soils on some side slopes and foot slopes. These Elloam soils make up about 5 percent of the unit. Areas

of Phillips and Tinsley soils each make up about 5 percent of the complex.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

Soils in this complex are suited to range and wildlife habitat. Capability unit VIIe–1, dryland; windbreak suitability group 4; Sunburst soil in Thin Hilly range site, Lisam soil in Shallow Clay range site.

Tally series

The Tally series consists of deep, well drained soils that formed in alluvium. The soils are on uplands. Sand is at depths of 20 to 40 inches. Slopes are 0 to 15 percent. The native vegetation is mainly needleandthread, prairie sandreed, little bluestem, western wheatgrass, blue grama, threadleaf sedge, and forbs.

In a representative profile the surface layer is dark grayish brown sandy loam about 8 inches thick. The subsoil is 12 inches of brown sandy loam. The underlying material is very pale brown loamy fine sand to a depth of 26 inches. Below that it is light yellowish brown and light gray fine sand to a depth of 60 inches or more.

Permeability is moderate to a depth of about 20 inches and moderately rapid below that depth. The available water capacity is low or moderate. Reaction is slightly acid to a depth of about 8 inches, neutral to a depth of 20 inches, and moderately alkaline below.

These soils are used mainly for dryfarmed crops and pasture. Some areas are used for range and wildlife habitat.

Representative profile of Tally sandy loam in an area of Tally-Dooley sandy loams, 0 to 5 percent slopes, in a cultivated field, 1,900 feet east and 50 feet north of the southwest corner of sec. 15, T. 33 N., R. 43 E.:

Ap—0 to 8 inches, dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; slightly acid; abrupt smooth boundary.

B21—8 to 16 inches, brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure; hard, friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

B22—16 to 20 inches, brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; weak coarse prismatic structure; hard, very friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

C1ca—20 to 26 inches, very pale brown (10YR 7/3) loamy fine sand, brown (10YR 5/3) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; violently effervescent; moderately alkaline; gradual smooth boundary.

IIC2—26 to 46 inches, light yellowish brown (2.5Y 6/4) and light gray (2.5Y 7/2) fine sand, olive brown (2.5Y 4/4) and dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable; few very fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

IIC3—46 to 60 inches, light gray (2.5Y 7/2) fine sand, grayish brown (2.5Y 5/2) moist; massive; soft, very friable; strongly effervescent; moderately alkaline.

The thickness of the A horizon and B horizon combined ranges from 15 to 20 inches. The B2 horizon is brown or dark brown and is 10 to 18 percent clay. The IIC horizon is fine sand, sand, loamy sand, or loamy fine sand.

62—Tally sandy loam, 2 to 5 percent slopes. This undulating soil is on uplands.

Included with this soil in mapping are areas that have a sandy clay loam surface layer or a loamy sand surface layer. Also included are areas where loose sand is less than 20 inches deep and small areas of Dooley, Lihen, Williams, and Parshall soils.

Surface runoff is medium. The hazard of wind erosion is severe, and the hazard of water erosion is moderate.

This soil is suited to dryfarmed wheat, barley, oats, pasture, and hay. It is also suited to range and wildlife habitat. Capability unit IIIe–3, dryland; Sandy range site; windbreak suitability group 2M.

63—Tally-Dooley sandy loams, 0 to 5 percent slopes. This complex consists of nearly level and undulating soils on uplands. About 60 percent is Tally sandy loam, and about 30 percent is Dooley sandy loam. The Tally soil in this complex has the profile described as representative of the Tally series.

Included with these soils in mapping are areas of Parshall sandy loam and Farnuf loam and small areas where the surface layer is sandy clay loam. The included soils make up about 10 percent of the map unit.

Surface runoff is medium. The hazard of wind erosion is severe, and the hazard of water erosion is moderate.

The soils in this complex are suited to dryfarmed wheat, barley, oats, pasture, and hay. They are also suited to range and wildlife habitat. Capability unit IIIe–3, dryland; Sandy range site; Tally soil in windbreak suitability group 2M, Dooley soil in windbreak suitability group 1.

64—Tally-Dooley sandy loams, 5 to 15 percent slopes. This complex consists of gently rolling and strongly rolling soils on uplands. About 40 percent is Tally sandy loam, and about 35 percent is Dooley sandy loam. The Dooley soil in this complex has the profile described as representative of the Dooley series.

Included with these soils in mapping, and making up about 25 percent of the acreage, are small areas of Parshall sandy loam, Doney loam, and Lihen loamy sand.

Surface runoff is medium. The hazard of wind and water erosion is severe.

These soils are suited to dryfarmed wheat, barley, and oats. They are also suited to range and wildlife habitat. Capability unit IVe–1, dryland; Sandy range

site; Tally soil in windbreak suitability group 2M, Dooley soil in windbreak suitability group 1.

Telstad series

The Telstad series consists of deep, well drained soils that formed in glacial till. The soils occupy glaciated uplands. Slopes are 1 to 15 percent. The native vegetation is mainly needleandthread, western wheatgrass, green needlegrass, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and forbs.

In a representative profile the surface layer is grayish brown loam about 8 inches thick. The subsoil extends to a depth of 34 inches. The upper part of the subsoil is 8 inches of brown clay loam. The lower part is 18 inches of light brownish gray loam. The underlying material, to a depth of 60 inches or more, is light gray clay loam.

Permeability is moderate to a depth of about 34 inches and slow below that depth. The available water capacity is high. Reaction is neutral to mildly alkaline to a depth of 16 inches and moderately or strongly alkaline below.

These soils are used mainly for dryfarmed crops and pasture. They are also used for range and wildlife habitat.

Representative profile of Telstad loam, 1 to 9 percent slopes, in a cultivated field, 1,350 feet west and 100 feet south of the northeast corner of sec. 24, T. 33 N., R. 41 E.:

Ap—0 to 8 inches, grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; slightly hard, very friable, sticky and slightly plastic; common very fine roots; neutral; abrupt smooth boundary.

B2t—8 to 16 inches, brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; strong medium prismatic structure; hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; many moderately thick clay films on faces of peds; 2 percent pebbles; mildly alkaline; clear smooth boundary.

B3ca—16 to 34 inches, light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure, hard, very friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; 2 percent pebbles; few medium soft masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

C1ca—34 to 50 inches, light gray (2.5Y 7/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; few fine soft masses of lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

C2—50 to 60 inches, light gray (2.5Y 7/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; 2 percent pebbles; strongly effervescent; strongly alkaline.

The A horizon is grayish brown or brown. In native grass, it is 3 to 5 inches thick. The B2t horizon is 30 to 35 percent clay. The thickness of the A horizon and noncalcareous part of the B horizon combined ranges from 10 to 18 inches. The soil is 0 to 10 percent gravel and cobble size fragments.

65—Telstad loam, 1 to 9 percent slopes. This nearly level to gently rolling soil is on glaciated uplands. It has the profile described as representative of the series.

Included with this soil in mapping are some small areas of Hillon soils on convex parts of the landscape and Phillips soils in concave and on flat parts. Also included are a few small areas of Nishon soils in some closed basins, where runoff is very slow or ponded.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

The soil is suited to dryfarmed wheat, barley, oats, hay, and pasture. It is also suited to range and wildlife habitat. Capability unit IIIe-1, dryland; Silty range site; windbreak suitability group 1.

Thebo series

The Thebo series consists of moderately deep, well drained soils that formed in material weathered from clay shale. The soils occupy uplands. Clay shale is at a depth of about 23 inches. Slopes are 2 to 15 percent. The native vegetation is mainly western wheatgrass, green needlegrass, bluebunch wheatgrass, and some forbs.

In a representative profile the surface layer is light brownish gray clay about 4 inches thick. The underlying material, to a depth of 23 inches, is light brownish gray clay and shaly clay. Clay shale is below 23 inches.

Permeability is slow. The available water capacity is moderate. Reaction is moderately alkaline.

These soils are used mainly for range and wildlife habitat. Some areas are used for dryfarmed crops.

Representative profile of Thebo clay, in an area of Thebo-Lisam clays, 2 to 15 percent slopes, in native grass, 150 feet east of the Pines Road, 1,100 feet west and 700 feet north of the southeast corner of sec. 1, T. 25 N., R. 38 E.:

A1—0 to 4 inches, light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; strong very fine granular structure; very hard, very firm, sticky and very plastic; common very fine roots; 1 percent angular pebbles coated with clay; weakly effervescent; moderately alkaline; clear smooth boundary.

C1—4 to 16 inches, light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure that parts to moderate fine granular; very hard, very firm, sticky and very plastic; common very fine roots; many fine tubular pores; 1 percent angular pebbles; cracks 1/4 to 1 inch wide; pressure cutans on prism faces; strongly effervescent; moderately alkaline; clear wavy boundary.

C2cs—16 to 23 inches, light brownish gray (2.5Y

6/2) shaly clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky and plastic; common very fine roots; 30 percent soft weathered shale chips; many medium distinct seams and soft masses of gypsum; common light brownish gray (2.5Y 6/2 moist) soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C3r—23 to 60 inches, gray (5Y 6/1) clay shale, dark gray (5Y 4/1) moist; few roots extending into cracks and between shale chips in upper part.

The soil is 60 to 75 percent clay. The depth to clay shale ranges from 20 to 40 inches, but is mainly 20 to 30 inches.

66—Thebo clay, 2 to 9 percent slopes. This undulating and gently rolling soil is on uplands. Included with this soil in mapping are small areas of Lisam and Marias soils.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

This soil is suited to dryfarmed wheat, barley, and oats. It is also suited to range and wildlife habitat. Capability unit IVe-3, dryland; Clayey range site; windbreak suitability group 2M.

67—Thebo-Elloam clays, 2 to 9 percent slopes. This complex consists of undulating to gently rolling soils on uplands. About 45 percent is Thebo clay, and about 40 percent is Elloam clay. The Elloam soil has a profile similar to the one described as representative of the series, except that it has a clay surface layer. Thebo clay is on convex parts of the landscape and upper side slopes of hills and knolls. Elloam clay is on the lower slopes and in low areas.

Included with these soils in mapping are areas of Lisam and Thoeny soils. Also included are some areas where the surface layer is clay loam or gravelly clay loam. These included soils make up about 15 percent of this map unit.

Surface runoff is medium or rapid, and the hazard of wind and water erosion is moderate.

Soils in this complex are suited to range and wildlife habitat. They are also suited to dryfarmed wheat, barley, and oats. Capability unit IVe-3, dryland; Thebo soil in Clayey range site, Elloam soil in Dense Clay range site; Thebo soil in windbreak suitability group 2M, Elloam soil in windbreak suitability group 3S.

68—Thebo-Lisam clays, 2 to 15 percent slopes. This complex consists of undulating to strongly rolling soils on uplands. About 50 percent is Thebo clay, and about 40 percent is Lisam clay. Each soil has the profile described as representative for its series. The Thebo soil is on foot slopes and side slopes. The Lisam soil is on upper slopes and tops of knolls and ridges.

Included with these soils in mapping are areas of Vaeda, Phillips, and Absher soils and some small areas of shale outcrop. These inclusions make up about 10 percent of this map unit.

Surface runoff is medium or rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

Soils in this complex are suited to range and wildlife habitat. Capability unit VIe-1, dryland; Thebo soil in Clayey range site, Lisam soil in Shallow Clay range site; Thebo soil in windbreak suitability group 2M, Lisam soil in windbreak suitability group 4.

Thoeny series

The Thoeny series consists of deep, well drained soils that formed in glacial till. The soils occupy glaciated uplands. Slopes are 0 to 5 percent. The native vegetation is mainly western wheatgrass, green needlegrass, Sandberg bluegrass, and forbs.

In a representative profile the surface layer is pale brown loam about 6 inches thick. The subsoil extends to a depth of 19 inches. The upper 7 inches is brown clay and the lower 6 inches is light brownish gray clay loam. The underlying material is light brownish gray and gray clay loam to a depth of 60 inches or more.

Permeability is very slow, and the available moisture capacity is high. Reaction is medium acid in the surface layer, mildly alkaline to strongly alkaline in the subsoil, and moderately alkaline to strongly alkaline in the underlying material.

These soils are mainly used for range and wildlife habitat. A few areas are used for dryfarmed crops.

Representative profile of Thoeny loam, in an area of Thoeny-Phillips complex, 1 to 5 percent slopes, in native grass, 1,000 feet east and 300 feet north of the southwest corner of sec. 5, T. 30 N., R. 40 E.:

A2—0 to 6 inches, pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; moderate very thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many unstained silt and sand grains on plates; medium acid; abrupt smooth boundary.

B2t—6 to 13 inches, brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong medium columnar structure that parts to strong medium angular blocky in lower part; very hard, firm, sticky and plastic; common very fine roots; few very fine tubular pores; continuous moderately thick dark grayish brown (10YR 4/2 moist) clay films on faces of peds; 5 percent pebbles; top of columns coated with bleached silt and sand grains; mildly alkaline; clear smooth boundary.

B3tca—13 to 19 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure; hard, firm, sticky and plastic; common very fine roots; few very fine tubular pores; common thin clay films on faces of peds; 5 percent pebbles; common medium and fine soft masses of lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

C1ca—19 to 32 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure that parts to weak medium and coarse angular blocky; hard, firm, sticky and plastic; few very fine

roots; few medium soft masses and seams of salts in lower part; 5 percent pebbles; common soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2—32 to 45 inches, light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few very fine roots; 5 percent pebbles; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3cs—45 to 60 inches, gray (5Y 5/1) clay loam; dark gray (5Y 4/1) moist; massive; hard, firm, sticky and plastic; 5 percent pebbles; few medium seams and soft masses of gypsum; strongly effervescent; moderately alkaline.

The A horizon is light brownish gray or pale brown. The thickness of the A horizon under native grass is 4 to 8 inches. If cultivated, the A horizon is mainly clay loam. The B2t horizon is 40 to 50 percent clay. The C horizon has few to many masses of segregated lime and gypsum. The soil is 5 to 10 percent gravel.

69—Thoeny-Phillips complex, 1 to 5 percent slopes. This complex consists of nearly level and undulating soils on glaciated uplands. The Thoeny soil in this complex has the profile described as representative of the Thoeny series. About 55 percent is Thoeny loam, and about 35 percent is Phillips loam. Thoeny loam mainly is on concave and smooth sloping parts of the landscape. Phillips loam mainly is on convex parts.

Included with these soils in mapping are areas of Elloam soils, and a few small areas of Nishon soils in closed depressions. Elloam soils are in small areas throughout the unit. These included soils make up about 10 percent of this unit.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

Soils in this complex are suited to dryfarmed wheat, barley, and oats. They are also suited to range and wildlife habitat. Capability unit IVe–2, dryland; Thoeny soil in Dense Clay range site, Phillips soil in Silty range site; Thoeny soil in windbreak suitability group 3S, Phillips soil in windbreak suitability group 1.

Tinsley series

The Tinsley series consists of deep, excessively drained soils that formed in very gravelly alluvium. They occupy side slopes of valleys. Slopes are 9 to 35 percent. The native vegetation is mainly western wheatgrass, needleandthread, plains muhly, blue grama, and some forbs.

In a representative profile the surface layer is dark brown very gravelly sandy loam about 4 inches thick. The underlying material is brown very gravelly loamy sand to a depth of about 12 inches. Below this, it is grayish brown and light brownish gray very gravelly sand to a depth of 60 inches or more.

Permeability is rapid. The available water capacity is very low. Reaction is neutral to a depth of about 28 inches and moderately alkaline below.

These soils are used for range and wildlife habitat.

Representative profile of Tinsley very gravelly sandy loam, in an area of Tinsley-Reeder-Doney complex, 9 to 35 percent slopes, in native grass, 300 feet north and 300 feet west of the southeast corner of sec. 15, T. 35 N., R. 39 E.:

A1—0 to 4 inches, dark brown (10YR 4/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure; slightly hard, very friable, slightly sticky and nonplastic; many fine roots; 60 percent pebbles; neutral; clear smooth boundary.

C1—4 to 12 inches, brown (10YR 5/3) very gravelly loamy sand, dark brown (10YR 4/3) moist; single grained; loose, nonsticky and nonplastic; common very fine roots; about 60 percent pebbles; neutral; gradual smooth boundary.

C2—12 to 28 inches, grayish brown (2.5Y 5/2) very gravelly sand, dark grayish brown (2.5Y 4/2) moist; single grained; loose, nonsticky and nonplastic; common very fine roots; about 60 percent pebbles; neutral; clear smooth boundary.

C3ca—28 to 60 inches, light brownish gray (2.5Y 6/2) very gravelly sand, dark grayish brown (2.5Y 4/2) moist; single grained; loose, nonsticky and nonplastic; few very fine roots; about 60 percent pebbles; strongly effervescent; thin lime casts on lower sides of pebbles; moderately alkaline.

Depth to very gravelly loamy or very gravelly sand is 4 to 20 inches.

70—Tinsley complex, 9 to 35 percent slopes. This complex consists of strongly sloping and moderately steep soils on side slopes of stream valleys in uplands. About 40 percent is Tinsley very gravelly sandy loam and 60 percent is other soils. The Tinsley soil is mainly on ridges and upper slopes. The other soils are deep and moderately deep loam and clay loam soils on lower side slopes, foot slopes, and alluvial fans. These soils are intermingled with the Tinsley soils on ridges.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

Soils in this complex are suited to range and wildlife habitat. Capability unit VIe–1, dryland; Gravel range site; windbreak suitability group 4.

71—Tinsley-Reeder-Doney complex, 9 to 35 percent slopes. This complex consists of strongly sloping and moderately steep soils on side slopes of stream valleys in uplands. About 35 percent is Tinsley very gravelly sandy loam, about 35 percent is Reeder loam, and about 20 percent is Doney loam. The Tinsley soil has the profile described as representative of the Tinsley series. Tinsley soils are mainly on ridgetops and upper side slopes. Reeder and Doney soils are on side slopes and foot slopes. Reeder soils have slopes of less than 15 percent.

Included with these soils in mapping are areas of Turner loam. Also included are soils that have a sandy loam surface layer and underlying material. These included soils make up about 10 percent of this unit.

Surface runoff is rapid. The hazard of wind erosion is moderate, and the hazard of water erosion is severe.

These soils are suited to range and wildlife habitat.

Capability unit VIe–1, dryland; Tinsley soil in Gravel range site, Reeder and Doney soils in Thin Hilly range site; Tinsley and Doney soils in windbreak suitability group 4, Reeder soil in windbreak suitability group 2M.

Turner series

The Turner series consists of deep, well drained soils that formed in alluvium. The soils occupy fans and terraces on uplands. Very gravelly loamy sand is at a depth of about 30 inches. Slopes are 0 to 2 percent. The native vegetation is mainly western wheatgrass, green needlegrass, needleandthread, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, forbs, and shrubs.

In a representative profile the surface layer is dark grayish brown loam about 5 inches thick. The subsoil is 14 inches of brown clay loam. The underlying material to a depth of 30 inches is light brownish gray, very gravelly sandy loam. Below that it is light brownish gray very gravelly loamy sand to a depth of 60 inches or more.

Permeability is moderate to a depth of about 19 inches, moderately rapid to a depth of 30 inches, and rapid below that depth. The available water capacity is low or moderate. Reaction is neutral to a depth of about 19 inches and moderately alkaline below that depth.

These soils are mainly used for range, wildlife, dryfarmed crops, and pasture.

Representative profile of Turner loam, 0 to 2 percent slopes, in native grass, 50 feet west of road, 1,600 feet south and 50 feet west of the northeast corner of sec. 36, T. 37 N., R. 40 E.:

A1—0 to 5 inches, dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; neutral; clear smooth boundary.

B2t—5 to 19 inches, brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; strong medium prismatic structure; hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; continuous moderately thick clay films on faces of peds; 5 percent pebbles; neutral; gradual smooth boundary.

IIC1ca—19 to 24 inches, light brownish gray (2.5Y 6/2) very gravelly sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; 60 percent pebbles; thin lime casts on lower sides; violently effervescent; moderately alkaline; gradual smooth boundary.

IIC2ca—24 to 60 inches, light brownish gray (2.5Y 6/2) very gravelly loamy sand, dark grayish brown (2.5Y 4/2) moist; single grained; loose; few very fine roots; 60 percent pebbles; thin lime casts on lower sides; strongly effervescent; moderately alkaline.

The B2t horizon is 30 to 35 percent clay. The depth to lime ranges from 12 to 20 inches. The IIC1ca horizon ranges from very gravelly loam to very gravelly sandy loam and is 55 to 70 percent gravel and cobbles. The depth to very gravelly loamy sand or very gravelly sand, the IIC2ca horizon, ranges from 20 to 40 inches. The IIC2ca horizon is 60 to 80 percent gravel.

72—Turner loam, 0 to 2 percent slopes. This nearly level soil is on stream terraces. It has the profile described as representative of the series.

Included with this soil in mapping are a few small areas of soils that are 15 to 20 inches deep to the very gravelly underlying material and small areas of soils that are 20 to 36 inches deep to very gravelly loam or very gravelly sandy loam. Small areas of soils that have a gravelly loam surface layer are also included.

Surface runoff is slow. The hazard of wind erosion is moderate, and the hazard of water erosion is slight.

This soil is suited to dryfarmed wheat, barley, oats, and pasture. It is also suited to range and wildlife habitat. Capability unit IIIs–3, dryland; Silty range site; windbreak suitability group 3M.

73—Turner and Farnuf loams, wet, 0 to 2 percent slopes. This undifferentiated map unit consists of nearly level Turner loam and Farnuf loam on low stream terraces. Both soils have profiles similar to those described as representative of their series, except they are wet in the lower part of the profile because a seasonal water table is at a depth of 36 to 60 inches.

Included with these soils in mapping are a few small areas of soils that have sand and gravel at depths of less than 20 inches. Also included are some small areas of saline soils.

Surface runoff is slow. The hazard of wind erosion is moderate, and the hazard of water erosion is slight. These soils are subject to rare flooding.

The soils are suited to dryfarmed wheat, barley, oats, pasture, and hay. They are also suited to pasture, range, and wildlife habitat. Capability unit IIIw–3, dryland; Subirrigated range site; windbreak suitability group 2W.

Typic Fluvaquents

74—Typic Fluvaquents, gently sloping. This map unit consists of nearly level and gently sloping soils that formed in alluvium on flood plains, in oxbows, in abandoned stream channels, and on stream terraces. Slopes are 0 to 5 percent. This unit is mainly along perennial and intermittent streams. The surface layer and underlying material range from loam to clay. The soils are mostly poorly drained. In some small areas, water stands on the surface. The depth to the seasonal water table is mainly 20 to 40 inches. Included in mapping are small areas of well drained soils and small areas of saline soils.

Surface runoff is slow or the soil is ponded; flooding is frequent. The hazard of water erosion is moderate, and the hazard of wind erosion is slight.

The soils in this unit are suited to range and wildlife habitat. Capability unit VIw–1, dryland; Wetland range site; windbreak suitability group 4.

Ustic Torrifluvents

75—Ustic Torrifluvents, gently sloping. This map unit consists of soils that formed in recent deposits of

alluvium on nearly level to gently sloping low terraces, bottom lands, and flood plains. Slopes are 0 to 5 percent. Soils are mostly well drained and moderately well drained but are subject to common flooding. The soil is stratified loam to clay. Soil characteristics are extremely variable, and no one kind of soil can be consistently identified and mapped separately. Areas south of the Milk River, in the southern part of the county, have little or no gravel in the soil. In the northern part of the county, the soils are very gravelly along some streams. Some soils that are high in clay are strongly alkaline.

Surface runoff is mainly slow or medium. The hazard of water erosion is moderate, and the hazard of wind erosion is slight.

The soils in this unit are suited to range and wildlife habitat. Capability unit VIw–1, dryland; Overflow range site; windbreak suitability group 4.

Vaeda series

The Vaeda series consists of deep, well drained soils that formed in alluvium. The soils occupy fans and low terraces. Slopes are 0 to 5 percent. The native vegetation is mainly Sandberg bluegrass, Nuttall saltbush, and forbs.

In a representative profile the surface layer is light brownish gray silty clay about 3 inches thick. It has a hard surface crust. The underlying material is light brownish gray and gray silty clay to a depth of 72 inches or more.

Permeability is very slow. The available water capacity is low or moderate. Vaeda soils have low or moderate available water capacity. They have a high content of sodium (alkali) which causes a dispersed condition, and intake of water into the soil is restricted. Reaction is medium acid or strongly acid to a depth of 10 inches and neutral below that depth.

These soils are mainly used for range and wildlife habitat.

Representative profile of Vaeda silty clay, in native grass, 200 feet north and 200 feet east of the southwest corner of sec. 20, T. 26 N., R. 39 E.:

A2—0 to 3 inches, light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak thin platy structure and a 1-inch-thick vesicular surface crust; very hard, firm, very sticky and plastic; common fine roots; many fine vesicular pores; light gray (2.5Y 7/2) silt and sand on faces of peds; medium acid; clear smooth boundary.

C1cs—3 to 10 inches, light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak medium and thin platy structure that parts to moderate fine blocky; hard, firm, very sticky and plastic; many fine roots; many fine tubular pores; common fine masses and seams of gypsum; light gray (2.5Y 7/2) skeletans; strongly acid; clear smooth boundary.

C2cs—10 to 72 inches, gray (5Y 5/1) silty clay, dark gray (5Y 4/1) moist; weak medium angular blocky structure; very hard, firm, very sticky and plastic; common fine roots to a depth of 25 inches; many fine tubular pores; few fine seams and masses of gypsum; neutral; gradual smooth boundary.

The surface crust is 1/4 to 1 inch thick. The A horizon is light gray or light brownish gray. The depth to segregated gypsum is 3 to 10 inches. The C horizon is silty clay or clay.

76—Vaeda silty clay. This nearly level and gently sloping soil is on fans and terraces. Slopes are 0 to 3 percent. This soil has the profile described as representative of the series.

Included with this soil in mapping are small areas that have a silty clay loam surface layer. Also included are small areas of Absher soils along drainageways and small areas of Marias and Nobe soils.

This soil is subject to rare flooding. Surface runoff is medium to rapid. The hazard of wind erosion is slight, and the hazard of water erosion is moderate.

This soil is suited to range and wildlife habitat. Capability unit VIs–1, dryland; Dense Clay range site; windbreak suitability group 4.

Williams series

The Williams series consists of deep, well drained soils that formed in glacial till. The soils occupy glaciated uplands. Slopes are 2 to 9 percent. The native vegetation is mainly green needlegrass, needleandthread, western wheatgrass, bluebunch wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, and forbs.

In a representative profile the surface layer is dark grayish brown loam about 7 inches thick. The subsoil extends to a depth of 25 inches. The upper 10 inches of the subsoil is brown clay loam. The lower 8 inches is pale brown clay loam. The underlying material to a depth of 32 inches is pale brown loam. Below that it is very pale brown clay loam to a depth of 60 inches or more.

Permeability is moderate to a depth of about 32 inches and slow below that depth. The available water capacity is high. Reaction is neutral in the surface layer, mildly alkaline from 7 to 17 inches, and moderately alkaline below.

These soils are mainly used for dryfarmed crops and for pasture. Some areas are used for range and wildlife habitat.

Representative profile of Williams loam, 2 to 9 percent slopes, in a cultivated field, 2,100 feet west and 100 feet south of the northeast corner of sec. 25, T. 35 N., R. 40 E.:

Ap—0 to 7 inches, dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse angular blocky structure that parts to weak very fine granular; slightly hard, very friable, sticky and slightly plastic; common very fine roots; neutral; abrupt smooth boundary.

B2t—7 to 17 inches, brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; strong medium prismatic structure; hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; continuous moderately thick dark brown (10YR 3/3) moist, clay films on faces of

peds; 2 percent pebbles; mildly alkaline; gradual smooth boundary.

B3tca—17 to 25 inches, pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak medium prismatic structure; hard, friable, sticky and plastic; common very fine roots; many very fine tubular pores; few thin clay films on faces of peds; 2 percent pebbles; common medium white (10YR 8/2) soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C1ca—25 to 32 inches, pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; weak coarse prismatic structure; slightly hard, very friable, sticky and slightly plastic; common very fine roots; many very fine tubular pores; 2 percent pebbles; common fine soft masses of lime; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2ca—32 to 45 inches, very pale brown (10YR 7/3) clay loam, brown (10YR 5/3) moist; weak coarse angular blocky structure; hard, friable; sticky and plastic; few very fine roots; many very fine tubular pores; 2 percent pebbles; common medium and fine soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3—45 to 60 inches, very pale brown (10YR 7/3) clay loam, brown (10YR 5/3) moist; weak coarse angular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; 2 percent pebbles, strongly effervescent; moderately alkaline.

The A horizon is grayish brown or dark grayish brown. The thickness of the A horizon and noncalcareous part of the B horizon combined is 12 to 24 inches. The B2t horizon is from 30 to 35 percent clay. The soil is 2 to 8 percent pebbles.

77—Williams loam, 2 to 9 percent slopes. This undulating and gently rolling soil is on glaciated uplands. Included with this soil in mapping are some small areas that have a gravelly surface layer and are on convex parts of the landscape. Also included are small areas that have a sandy loam surface layer and small areas of Farnuf and Tally soils.

Surface runoff is medium, and the hazard of wind and water erosion is moderate.

This soil is suited to dryfarmed wheat, barley, oats, pasture, and hay. It is also suited to range and wildlife habitat. Capability unit IIIe–2, dryland; Silty range site; windbreak suitability group 1.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops; yield estimates; flooding; the functioning of septic tank disposal systems; and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, range, and windbreaks; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

The soils of Valley County are used mostly for range and dryfarmed crops. Elevation in the county ranges from about 2,000 to 3,300 feet. The mean annual precipitation is 10 to 14 inches, and the mean annual air temperature is 38 to 44 degrees. The frost-free season is mainly 110 to 130 days, except in the northeastern part of the county where it is 100 to 110 days.

Use of the soils for crops

About 25 percent of the acreage of Valley County is used for crops and pasture. The main cultivated crops are wheat, barley, and hay. The principal forage crops are alfalfa and grass.

About 760,000 acres were dryfarmed in 1974. Spring wheat and barley are the main crops. Winter wheat, oats, and tame pasture are also grown. A limited acreage of safflower, mustard, flax, and alfalfa and grass seed crops are also grown. Conserving moisture and controlling erosion are the main concerns in managing dryfarmed soils.

Most dryfarmed soils have moderate to high natural

fertility. Increased yields can be obtained by adding fertilizer. Fertilizers containing nitrogen and phosphorus are the main ones needed. Crop response to additions of fertilizer is much better during wet years than during dry years.

The most common cropping system is alternating grain one year and fallow the next. Tilling is done mostly with sweeps, chisel implements, and rod weeders. These implements leave most of the crop residue on the soil surface, which helps to control erosion. Fallow tillage helps to eliminate weeds and control wind erosion. Using too many management practices tends to dry the soil.

Wind and water erosion can be controlled by protecting the surface with stubble mulch and stripcropping. When stripcropping, the texture and structure of the surface layer of the soil determine the width of strips needed to control wind erosion.

In some areas where slopes are more than 5 percent, contour farming and grassed waterways help to control erosion from runoff. Field windbreaks and tall grass barriers can also be used to control wind erosion.

About 40,000 acres in the county were irrigated in 1974. The main irrigated crops are alfalfa and grass hay, wheat, barley, oats, corn for silage, and tame pasture. In managing irrigated soils, practices that maintain soil fertility, efficiently use water, and control erosion are most important.

Most of the soils have moderate to high natural fertility. Yields of most crops can be increased by additions of barnyard manure or commercial fertilizers. Fertilizers that contain nitrogen and phosphorus are the main ones needed. Legume crops, such as alfalfa, increase the amount of nitrogen in the soil. Fertilizers mainly supplement the natural soil fertility during the year they are applied. Some phosphorous fertilizers that are applied one year may continue in effectiveness during future years, but nitrogen generally does not. The residual benefit of fertilizer is reduced if the crops have responded well to applications or if excess water has been applied.

Irrigation systems should be designed for the kind of soil being irrigated. A proper system provides control of the distribution of water at minimum cost and labor. Poor irrigation practices waste water and erode the soil. Excess water leaches plant nutrients, creates drainage problems, raises water tables, and increases soil salinity. Where possible, canals and irrigation ditches should be lined to prevent seepage. Ditches are needed to drain excess surface water and provide internal soil drainage.

Management of saline and alkali soils

About 194,000 acres in Valley County are saline and alkali soils. Most are in range. Some are irrigated and some are dryfarmed.

Saline soils contain soluble salts in amounts that inhibit seed germination and plant growth. The native vegetation on saline soils is mainly salt-tolerant plants. Some areas are nearly barren of vegetation because of the high salt content. Nobe clay and Aquic Ustifluvents, saline, are examples of saline soils.

Salinity is caused by water tables rising and bringing up salts from deep in the soil. High water tables form because the soil has impermeable layers and restricted soil drainage. Seepage from irrigation canals and ditches and overirrigation also cause high water tables and, therefore, saline soils. Many soils in the county were saline prior to irrigation, and many are naturally saline.

Saline soils are reclaimed by removing salts. One method of removing salts is to leach the soil by allowing water to pond on the surface or by overirrigation. Good surface and internal drainage is necessary to remove the salts from the plant root zone. Loamy and sandy soils are easiest to reclaim. Clay soils are more difficult.

Alkali soils contain more than 15 percent exchangeable sodium. They do not have harmful amounts of salts. The sodium disperses the clay in these soils, which causes poor physical condition. Alkali soils have a hard, crusty surface layer and very slow permeability.

Poor soil aeration is also a problem. Vaeda silty clay is a good example of an alkali soil.

Alkali soils are caused by parent material that contains a high amount of sodium. In many places alkali soils have spots on the surface called "slickspots" or "panspots."

Alkali soils are difficult to reclaim. No single method applies in all cases. Sampling and testing of the soils are necessary to determine what methods to apply. If the sodium is concentrated near the surface in scattered pan spots or slickspots, the soil can be reclaimed by deep plowing or by spreading large amounts of gypsum on the spots. Artificial leaching with water is required if sodium is present throughout the soil or if sodium occurs with a high content of salts.

In many places reclaiming saline or alkali soils is not practical because of the high cost of amendments, the difficulty in providing and maintaining adequate drainage, and the slow permeability of some soils. Those soils that cannot be reclaimed completely can be cropped if suitable cropping systems and management practices are used.

The management practices suitable for saline and alkali soils include (1) selecting crops or crop varieties that produce satisfactory yields under moderately saline or alkali conditions; (2) using land preparation and tillage methods that control or remove salts and alkali; (3) planting by special procedures that minimize the concentration of salts around the seed; (4) irrigating by methods that maintain a relatively high content of moisture in the root zone during the growing season and that allow for periodic leaching of the soil; (5) maintaining ditches and drainage systems; and (6) using special treatments, such as addition of chemical amendments, where needed, heavy applications of organic matter, and growing sod to improve soil structure.

Where salinity or alkalinity cannot be entirely eliminated, crops can be selected that produce satisfactory yields under existing conditions. In selecting crops for these kinds of soils, particular attention should be given to the salt or alkali tolerance of the crop during the germination period. Poor yields often result from failure to establish a good stand. Some crops that are salt- or alkali-tolerant during later stages of growth are quite sensitive to salinity or alkalinity during germination. Among the crops that tolerate saline and alkali soils are barley and western and tall wheatgrass.

Small areas on dry cropland called "saline seeps" are on some farms in the county. A saline seep is an area of recently developed saline soil in formerly good cropland that is wet part or all of the time. It usually has white salts on the surface. Crop or grass production on these spots is reduced or eliminated.

Saline seeps are the result of excess water accumulating in the soils uphill. The excess water moves down through the soil until it comes to a layer that restricts further downward movement. The water then moves laterally along the top of the impermeable layer until it comes to the surface in the seep area. The water dissolves salts that are in the soil and deposits them in the seep area. The area that the excess water flows from is called the recharge area, and the seep area is called the discharge area. Fallow land is usually a big contributor to saline seeps.

One method of controlling the development of saline seeps is to annually crop the recharge area. Annual cropping uses more soil moisture than the crop-fallow rotation system. The crop uses the soil moisture before it can move past the root zone and into the discharge area to cause a saline seep. Deep rooted crops, such as alfalfa, can also be grown in the recharge area to absorb soil moisture.

Capability grouping

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use. (None in this survey area.)

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use. (None in this survey area.)

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, *IIe.* The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage) ; *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

The capability unit is identified in the description of each soil map unit in the section "Descriptions of the soils." Capability units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

Management practices for nonirrigated and irrigated soils are described by capability units in the pages that follow. Management needed by an irrigated soil generally is different from that needed by a dryland soil. For this reason, some soils that are suited to irrigation are placed in a higher capability class if they are irrigated, because their limitation as a dryland soil has been removed. For example, a soil in capability unit IIIe-1, dryland, may be in capability unit IIe-1, irrigated. To find the names of the soils in a given capability unit, refer to the "Guide to Map Units."

Capability unit IIe-1, irrigated

This unit consists of deep, well drained soils that have a loam or silty clay loam surface layer and a sandy loam to silty clay loam subsoil and underlying material. Slopes are 0 to 3 percent. The frost-free season is 110 to 130 days.

Permeability is moderate or moderately rapid, and the available water capacity is moderate or high. The hazard of wind erosion is moderate, and the hazard of water erosion is slight to moderate. Runoff is slow. The soils are subject to rare flooding.

The soils are well suited to most crops grown in the county. The main crops are wheat, barley, oats, corn for silage, alfalfa and grass hay, and pasture. The soils also have potential for growing vegetable crops.

Proper water management practices help to control erosion. Leveling is needed for proper distribution of irrigation water. Using crop residue on the surface helps to maintain good soil tilth and to control erosion.

Capability unit IIs-1, irrigated

This unit consists of deep, well drained soils that have a silty clay loam or silty clay surface layer and

loam to silty clay underlying material. Slopes are 0 to 2 percent. The frost-free season is 110 to 130 days.

Permeability is moderate or slow, and the available water capacity is high. The hazard of water erosion is slight, and the hazard of wind erosion is moderate. Runoff is slow.

The soils are well suited to most crops grown in the county. The main crops are wheat, barley, oats, alfalfa and grass hay, corn for silage, and pasture.

Ditches are needed to drain excess water from the surface and from within the soil. This practice prevents the accumulation of salts, which can occur in irrigated soils that do not have an adequate drainage system.

Proper water management practices help to control erosion. Leveling is needed in some areas to improve water distribution. Using crop residue helps maintain good soil tilth and also control erosion. If these soils are plowed in spring when they are wet, hard clods form that are difficult to break down for a good seedbed. If they are plowed in fall, winter freezing and thawing break the clods into fine granules. Because these dry granules are subject to wind erosion, the surface should be left rough until seeding time.

Capability unit IIIw-1, irrigated

This unit consists of deep, well drained and poorly drained soils that have a silty clay or clay surface layer and silty clay loam to clay underlying material. Some of the soils are slightly and moderately saline, and some small areas are strongly saline. Slopes are 0 to 2 percent. The frost-free season is 110 to 130 days.

Permeability is slow, and the available water capacity is high. The hazard of water erosion is slight, and the hazard of wind erosion is slight to moderate. Runoff is slow to ponded. The seasonal high water table is at depths of 40 to 72 inches. In some areas, water stands on the surface for several weeks during spring of some years.

With proper drainage the soils are suited to most crops grown in the county. The main crops are wheat, barley, oats, alfalfa and grass hay, and pasture.

Proper water management practices help to control wetness on these soils. Ditches are needed to drain excess water from the soil and also to lower the water table. Leveling is needed in some areas to improve water distribution. Irrigation water must be carefully managed to maintain the water table below a depth of about 3 to 4 feet.

Capability unit IIIs-1, irrigated

Harlem clay is the only soil in this capability unit. It is a deep, well drained soil that has a clay surface layer and silty clay loam to silty clay underlying material. Slopes are 0 to 2 percent. The frost-free season is 110 to 130 days.

Permeability is slow, and the available water capacity is high. The hazard of water erosion is slight, and the hazard of wind erosion is moderate. Runoff is slow.

This soil is suited to most crops grown in the county. The main crops are wheat, barley, oats, alfalfa and grass hay, corn for silage, and pasture.

Proper water management practices help to control erosion. Leveling is needed in some areas to improve water distribution. Ditches are needed to drain excess water from the surface and from within the soil. This practice prevents the accumulation of salts, which can occur in irrigated soils that do not have an adequate drainage system. Using crop residue helps to maintain good soil tilth and to control erosion. When this soil is plowed, hard clods form that are difficult to break down for a good seedbed. If it is plowed in fall, winter freezing and thawing break the clods into fine granules. Because these granules, when dry, are susceptible to wind erosion, the surface should be left rough until seeding time.

Capability unit VIs-1, irrigated

Bowdoin clay is the only soil in this capability unit. It is a deep, well drained soil that has a clay surface layer and underlying material. Slopes are 0 to 2 percent. The frost-free season is 110 to 130 days.

Permeability is very slow, and the available water capacity is high. The hazard of wind and water erosion is slight, and runoff is slow.

The crops grown on this soil are primarily tame grass hay and pasture. The choice of crops is limited because of the high clay content of the soil.

The very slow permeability of this soil causes water management problems. It is difficult to moisten the soil to adequate depths. Frequent irrigation runs of short duration are usually more effective than letting water stand on the surface for long periods of time. Leveling is needed in some areas to improve water distribution. Ditches are needed to drain excess water from the surface and from within the soil. This practice prevents the accumulation of salts, which can occur in irrigated soils that do not have adequate drainage systems.

Tillage of this soil is difficult; when plowed, it forms hard clods that are difficult to break down for a good seedbed. The hard clods and surface crusting make it difficult for plants to sprout and to emerge after sprouting. The seedbed can be improved by fall plowing and mixing barnyard manure and crop residue into the plow layer.

Capability unit IIIe-1, dryland

This unit consists of deep, well drained soils that have a loam to clay surface layer and sandy loam to clay subsoil and underlying material. Slopes are 0 to 9 percent. The frost-free season is 110 to 130 days.

Permeability is moderately rapid to slow, and the available water capacity is moderate or high. The hazard of wind and water erosion is moderate, and runoff is medium.

The soils are suited to wheat, barley, oats, hay, and pasture. Wheat and barley are alternated with fallow periods in a crop rotation system.

Minimum tillage, contour cultivation, grassed waterways, and stripcropping help to control erosion. Using crop residue on the surface helps maintain good soil tilth and also control erosion.

Capability unit IIIe-2, dryland

This unit consists of deep and moderately deep, well drained soils that have a loam surface layer and loam to clay loam subsoil and underlying material. Slopes are 0 to 9 percent. The frost-free season is 100 to 110 days.

Permeability is moderate to slow. The available water capacity is moderate or high. The hazard of wind and water erosion is moderate. Runoff is medium.

The soils are well suited to spring wheat, barley, oats, hay, and pasture. Spring wheat, barley, and oats are alternated with fallow periods in a crop rotation system. The use of commercial fertilizers helps to significantly increase crop yields during years when the amount of precipitation is average or high.

Minimum tillage, contour cultivation, grassed waterways, and stripcropping help to control erosion. Using crop residue helps maintain good soil tilth and control erosion.

Capability unit IIIe-3, dryland

This unit consists of deep, well drained soils that have a sandy loam surface layer, a sandy loam and sandy clay loam subsoil, and fine sand to clay underlying material. Slopes are 0 to 5 percent. The frost-free season is 100 to 110 days.

Permeability is moderate in the surface layer and subsoil and rapid to slow in the underlying material. The available water capacity is low to high. The wind erosion hazard is severe, and the water erosion hazard is moderate. Runoff is medium.

The soils are suited to spring wheat, barley, oats, hay, and pasture. Spring wheat, barley, and oats are alternated with fallow periods in a rotation system. The use of commercial fertilizer helps to significantly increase yields during years when precipitation is average or high.

Intensive management is needed on these soils. Minimum tillage, field windbreaks, grassed waterways, and narrow stripcropping help control erosion. Using crop residue on the surface helps maintain good soil tilth and also helps control erosion. The severe hazard of wind erosion makes protecting the surface difficult. Some areas should be seeded to permanent vegetation for hay or pasture.

Capability unit IIIw-2, dryland

Nishon loam is the only soil in this capability unit. It is a deep, somewhat poorly drained soil that has a loam surface layer and clay subsoil and underlying material. Slopes are 0 to 2 percent. The frost-free season is 110 to 130 days.

Permeability is very slow, and the available water capacity is high. The hazard of wind and water erosion is slight. Runoff is very slow, or the soils are ponded. Ponding during the spring delays seeding, but does not prevent harvesting a crop in most years.

The soils are suited to wheat, barley, oats, hay, and pasture. Surface drainage is needed to prevent ponding. Minimum tillage helps control erosion. Using crop residue helps maintain good soil tilth and also control erosion.

Capability unit IIIw-3, dryland

Turner and Farnuf loams, wet, 0 to 2 percent slopes, is the only map unit in this capability unit. These are deep, well drained soils that have a loam surface layer, a clay loam subsoil, and clay loam to gravelly loamy sand underlying material. The frost-free season is 100 to 110 days.

Permeability is moderate or moderately slow in the surface layer and subsoil and moderately slow to rapid in the underlying material. The available water capacity is high to low. The hazard of wind erosion is moderate, and the hazard of water erosion is slight. Runoff is slow. The soils have a seasonal water table at a depth of 40 to 60 inches.

The soils are suited to wheat, barley, oats, hay, and pasture.

Minimum tillage and stripcropping help control erosion. Using crop residue on the surface helps maintain good soil tilth and helps control erosion. Care must be taken to maintain the water table at a depth of more than 40 inches.

Capability unit IIIs-2, dryland

This unit consists of deep, well drained soils that have a silty clay loam to clay surface layer and underlying material. Slopes are 0 to 2 percent. The frost-free season is 110 to 130 days.

Permeability is moderate to slow, and the available water capacity is high. The hazard of water erosion is slight, and the hazard of wind erosion is moderate. Runoff is slow.

The soils are suited to wheat, barley, oats, hay, and pasture. Wheat and barley are alternated with fallow periods in a crop rotation system.

Most of these soils have a silty clay or clay surface layer. When plowed, the soils form hard clods that are difficult to break down for a good seedbed. If they are plowed in fall, winter freezing and thawing break down the clods to fine granules. Because these granules, when dry, are susceptible to wind erosion, the surface should be left rough until seeding time. Stripcropping helps control erosion. Using crop residue on the surface helps maintain good tilth and also control erosion.

Capability unit IIIs-3, dryland

This unit consists of deep, well drained soils that have a loam surface layer, a loam to clay subsoil, and clay loam to very gravelly sand underlying material. Most of the soils of this capability unit have very gravelly underlying material. Slopes are 0 to 4 percent. The frost-free season is 100 to 130 days.

Permeability is moderate in the surface layer, moderate to very slow in the subsoil, and slow to rapid in the underlying material. The available moisture capacity is low to high. The hazard of wind erosion is moderate, and the hazard of water erosion is slight or moderate. Runoff is low or medium. Plant root development, available moisture capacity, and permeability are affected by the clay subsoil and very gravelly underlying material.

The soils are suited to wheat, barley, oats, hay, and pasture. Wheat and barley are alternated with fallow periods in a crop rotation system. Minimum tillage and stripcropping help control erosion. Using crop residue helps maintain good soil tilth and also control erosion.

Capability unit IVe-1, dryland

This unit consists of deep, well drained soils that have a sandy loam surface layer, sandy loam or sandy clay loam subsoil, and sand to clay underlying material. Slopes are 1 to 15 percent. The frost-free season is 100 to 130 days.

Permeability is moderate or moderately rapid in the

surface and subsoil and moderately rapid to slow in the underlying material. The available water capacity is low to high. The hazard of wind erosion is severe, and the hazard of water erosion is slight to severe. Runoff is slow or medium.

The soils are suited to wheat, barley, oats, hay, and pasture. Wheat and barley are alternated with fallow periods in a crop rotation system.

Minimum tillage, field windbreaks, grassed waterways, and narrow stripcropping help control erosion. Using crop residue on the surface helps maintain good soil tilth and control erosion. The severe wind erosion hazard on these soils makes protecting the surface difficult. The soils should have only limited cultivation or be seeded to permanent vegetation for hay and pasture.

Capability unit IVe–2, dryland

This unit consists of deep, well drained soils that have a loam and clay loam surface layer and clay or clay loam subsoil and underlying material. Slopes are 1 to 9 percent. The frost-free season is 110 to 130 days.

Permeability is slow or very slow, and the available water capacity is high. The hazard of wind and water erosion is moderate. Runoff is medium.

These soils have a dense clay or clay loam subsoil that restricts plant root development, aeration, and movement of water through the soil. Deep plowing or other mechanical treatment that loosens the subsoil increases soil aeration and permeability and improves the zone of plant root development.

The soils are suited to wheat, barley, and oats. Wheat and barley are alternated with fallow periods in a crop rotation system. Minimum tillage, contour cultivation, grassed waterways, and stripcropping help control erosion. Using crop residue helps maintain good soil tilth and control erosion.

Capability unit IVe–3, dryland

This unit consists of moderately deep and deep, well drained soils that have a loam, silt loam, and clay surface layer, subsoil, and underlying material. Slopes are 2 to 15 percent. The frost-free season is 100 to 130 days.

Permeability is moderate to very slow, and the available water capacity is moderate or high. The hazard of wind erosion is moderate, and the hazard of water erosion is moderate or severe. Runoff is medium or rapid.

The soils are suited to wheat, barley, oats, and pasture. Wheat and barley are alternated with fallow periods in a crop rotation system.

Minimum tillage, contour cultivation, grassed waterways, and stripcropping help control erosion. Using crop residue on the surface helps maintain good soil tilth and control erosion.

Capability unit IVs–3, dryland

Elloam clay loam, 1 to 5 percent slopes, is the only soil in this unit. It consists of a deep, well drained soil that has a clay loam surface layer and a clay and clay loam subsoil and underlying material. Slopes are 1 to 5 percent. The frost-free season is 110 to 130 days.

Permeability is slow and the available water capacity is high. The hazard of wind and water erosion is moderate. Runoff is medium to rapid.

This soil has a dense clay subsoil that restricts plant root development, aeration, and movement of water through the soil. Deep plowing or other mechanical treatment that loosens the subsoil increases soil aeration and permeability and improves the zone of plant root development.

The soil is suited to wheat and barley, which are alternated with fallow periods in a crop rotation system.

Minimum tillage, contour cultivation, grassed waterways, and stripcropping help control erosion. Using crop residue helps maintain good soil tilth and control erosion.

Capability unit IVs–4, dryland

Havre-Rivra complex is the only map unit in this capability unit. It consists of deep, well drained soils that have a clay loam and silty clay loam surface layer and silty clay loam to very gravelly loamy sand underlying material. Slopes are 0 to 2 percent. The frost-free season is 110 to 130 days.

Permeability is moderate to very rapid, and the available water capacity is high to very low. Some of the soils are droughty because of low water-holding capacity. The hazard of wind erosion is moderate, and the hazard of water erosion is slight. Runoff is slow.

The soils are suited to wheat, barley, oats, and hay. Wheat and barley are alternated with fallow periods in a crop rotation system.

Minimum tillage and stripcropping help control erosion. Using crop residue helps maintain good soil tilth and control erosion.

Capability unit VIe–1, dryland

This unit consists of shallow to deep, well drained soils that have a very gravelly sandy loam to clay surface layer, subsoil, and underlying material. A small acreage has very gravelly loamy sand or very gravelly sand underlying material. Slopes are 2 to 35 percent. The frost-free season is 100 to 130 days.

Permeability is slow to rapid, and the available water capacity is very low to high. The wind erosion hazard is slight to severe, and the water erosion hazard is moderate to severe. Runoff is medium to rapid.

Management of the soils in this capability unit is discussed in the section on Range under the appropriate range site.

Capability unit VIe–2, dryland

Lihen loamy fine sand, 2 to 9 percent slopes, is the only soil in this unit. It is a deep, well drained soil that has a loamy fine sand surface layer and underlying material. The frost-free season is 100 to 110 days.

Permeability is rapid, and the available water capacity is low. The wind erosion hazard is severe, and the water erosion hazard is slight. Runoff is slow.

A permanent vegetative cover should be kept on these soils to prevent wind erosion. The soils are suited to pasture and range.

Management of this soil is discussed in the section on Range under the appropriate range site.

Capability unit VIw–1, dryland

This unit consists of deep, well drained to poorly drained soils that have a loam to clay surface layer,

subsoil, and underlying material. Some of the soils are affected by alkali and salinity. Most of the soils have a seasonal high water table at a depth of 2 to 6 feet. Some are subject to overflow from streams during periods of high runoff. Slopes are 0 to 5 percent. The frost-free season is 100 to 130 days.

Permeability is variable, and the available water capacity is low to high. The water erosion hazard is slight or moderate. The wind erosion hazard is slight. Runoff is slow or medium or the soils are ponded.

Management of the soils in this capability unit is discussed in the section on Range under the appropriate range site.

Capability unit VIs-1, dryland

This unit consists of deep, moderately well drained and well drained soils that have a loam to clay surface layer, subsoil, and underlying material. Some of the soils are gravelly and cobbly. The soils are affected by sodium and salinity. Slopes are 0 to 9 percent. The frost-free season is 110 to 130 days.

Permeability is slow to very slow, and the available water capacity is low to high. The wind and water erosion hazard is slight or moderate. Surface crusting of the soils severely hinders seedling emergence. Runoff is slow to rapid.

Management of the soils in this unit is discussed in the section on Range under the appropriate range site.

Capability unit VIs-2, dryland

Scobey stony clay loam, 2 to 15 percent slopes, is the only soil in this unit. It is a deep, well drained soil that has a clay loam surface layer, clay loam or clay subsoil, and clay loam underlying material. It is stony especially on knolls and ridges. The frost-free season is 110 to 130 days.

Permeability is slow and the available water capacity is high. The hazard of wind and water erosion is moderate. Runoff is medium.

The stones in and on this soil limit its use to range. Management is discussed in the section on Range under the appropriate range site.

Capability unit VIIe-1, dryland

This unit consists of shallow to deep, well drained soils that have a loam to clay surface layer and underlying material. Most of the soils are 10 to 40 inches deep to shale or sandstone. Shale and sandstone outcrops also occur in the unit. Slopes are 5 to 35 percent. The frost-free season is 110 to 130 days.

Permeability is moderate to slow, and the available water capacity is very low to high. The water erosion hazard is severe, and the wind erosion hazard is moderate. Runoff is medium to rapid.

Management of the soils in this unit is discussed in the section on Range under the appropriate range site.

Capability unit VIIs-1, dryland

This unit consists of deep, moderately well drained and well drained soils that have a clay loam or clay surface layer, subsoil, and underlying material. Most of the soils are moderately to strongly saline and alkali. Slopes are 0 to 4 percent. The frost-free season is 110 to 130 days.

Permeability is very slow, and the available water capacity is very low to high. The wind and water erosion hazard is slight to moderate. Runoff is slow to rapid. Salinity and surface crusting of the soils severely limit seedling emergence and growth of plants.

Management of the soils in the capability unit is discussed in the section on Range under the appropriate range site.

Capability unit VIII

This unit consists of Badland and Rock outcrop. It is mostly barren of vegetation. Included are some small areas of soil that produce limited vegetation for wildlife. The landforms and soils in this unit have limitations that restrict use to recreation, wildlife habitat, or esthetic purposes.

Predicted yields

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 2. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the soil is not suited to the crop or the crop is not commonly grown in the soil or that a given crop is not commonly irrigated.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 2.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown; that good quality irrigation water is uniformly applied in proper amounts as needed; and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 2 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Co-

operative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Use of the soils for windbreaks [2]

In this section information is provided on the management of soils to establish windbreaks in Valley County.

Windbreaks are belts of trees and shrubs planted to shelter farmsteads and feedlots from the wind and to control drifting snow. Some benefits are reduced fuel and building maintenance costs, stock mortality, and feed requirements. Another benefit is the creation of a more favorable environment in which to live and work around feedlots and farmsteads. Field windbreaks, or shelterbelts, are usually single row plantings established primarily to protect fallow fields from wind erosion. By effectively reducing windspeed, they protect new seedlings and crops and help create a beneficial microclimate for plant growth. Winter snows are held on the fields, which improves soil moisture.

Windbreaks offer more than control of the wind and snow around farmsteads, feedlots, and fields. A good windbreak makes an area more attractive and furnishes food and cover for birds and other wildlife. It serves as a living snow fence along roads and highways, as well as farm and fields; it muffles sounds from highway traffic, industry, or railroads; or it screens unsightly areas.

For windbreaks to be successful they need to be *planned.* The location, selection, and arrangement of trees and shrubs and provisions for weed control are very important.

Soils should be considered when selecting trees and shrubs for windbreaks. Not all windbreak species will grow on all soils. For example, cottonwood or willows do not grow on droughty, sandy, very gravelly, or shallow soils. Siberian peashrub will not survive on soils that are saturated for more than two weeks.

Soils that behave similarly have the same degree of hazards and limitations when used for growing trees and shrubs and are placed in the same windbreak suitability group. Factors considered in developing the windbreak suitability groups are: climate, available water holding capacity, depth to a concentrated lime layer in the soil, soil salinity and alkalinity, degree of wetness, and soil slope. Each windbreak suitability group is described in this section, and examples of common adapted tree and shrub species are listed for each.

For assistance in selecting adapted trees and shrubs and in designing windbreaks, contact the local Conservation District, Soil Conservation Service, or the Agricultural Extension Service.

Windbreak suitability groups

The soils of Valley County are placed in nine windbreak suitability groups. To identify the soils in a windbreak suitability group, refer to the "Guide to Map Units" at the back of this soil survey.

Windbreak suitability group 1

This group consists of deep, well drained soils. The available water capacity is high; permeability is moderate to slow. Where there is a concentrated lime layer, it is at a depth of more than 15 inches. Texture of the surface layer, subsoil, and underlying material is sandy loam to clay. Slopes range from 0 to 15 percent. Annual precipitation is 10 to 14 inches.

On soils that are dryfarmed, one season of summer fallow is necessary to provide adequate moisture for planting. When planting in areas that were originally in sod, two seasons of summer fallow are necessary to provide adequate moisture for planting and to control plant competition. During the fallow period and while plants are getting established, soils that have a sandy loam surface layer need protection from wind erosion.

Trees suited to dryland planting are Russian-olive, Siberian elm, ponderosa pine, Scotch pine, blue spruce, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, American plum, skunkbush sumac, silver buffaloberry, sandcherry, and dogwood.

Trees suited to irrigated planting are Russian-olive, Siberian crabapple, green ash, Siberian elm, white willow, golden willow, cottonwood, ponderosa pine, Scotch pine, blue spruce, and Rocky Mountain juniper. Shrubs that are suitable are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, American plum, skunkbush sumac, purple willow, silver buffaloberry, sandcherry, Nanking cherry, and dogwood.

Windbreak suitability group 2M

This group consists of moderately deep and deep, well drained soils. The available water capacity is low or moderate; permeability is moderately rapid to moderately slow. Texture of the surface layer, subsoil, and underlying material is sandy loam to clay. In some areas, sand or loamy sand is at depths of 20 to 40 inches. Slopes range from 0 to 15 percent. The annual precipitation is 10 to 14 inches.

On soils that are dryfarmed, one season of summer fallow is necessary to provide adequate moisture for planting. When planting in areas that were originally in sod, two seasons of summer fallow are necessary to provide adequate moisture for planting and to control plant competition. During the fallow period and while young plants are getting established, soils that have a sandy loam surface layer need protection from wind erosion.

Trees suited to dryland planting are Russian-olive, Siberian elm, ponderosa pine, Scotch pine, blue spruce, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, silver buffaloberry, and sandcherry.

Trees suited to irrigated plantings are Russian-olive, Siberian crabapple, green ash, Siberian elm, white willow, golden willow, cottonwood, ponderosa pine, Scotch pine, blue spruce, and Rocky Mountain juniper. Shrubs that are suitable are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, American plum, skunkbush sumac, purple willow, silver buffaloberry, sandcherry, Nanking cherry, and dogwood.

Windbreak suitability group 2L

This group consists of deep, well drained soils. The available water capacity is high; permeability is moderately slow. These soils have a concentrated lime layer

[2] HAROLD E. HUNTER, woodland conservationist, Soil Conservation Service, helped prepare this section.

TABLE 2.—*Yields per acre of*

[Absence of yield figure indicates that the crop is not suited

Soil	Winter wheat	Spring wheat		Barley	
	Dryland	Dryland	Irrigated	Dryland	Irrigated
	Bu	*Bu*	*Bu*	*Bu*	*Bu*
Attewan loam, 0 to 4 percent slopes	26	23	—	33	—
Bowdoin clay	—	—	—	—	—
Elloam clay loam, 1 to 5 percent slopes	18	15	—	25	—
Evanston loam, 0 to 2 percent slopes	35	30	—	42	—
Evanston loam, 2 to 9 percent slopes	35	30	—	42	—
Evanston loam, sandstone substratum, 2 to 5 percent slopes	32	28	—	40	—
Evanston-Lonna loams, 2 to 9 percent slopes	32	28	—	40	—
Evanston-Marias complex, 3 to 9 percent slopes	25	22	—	32	—
Evanston-Marmarth loams, 3 to 12 percent slopes	30	25	—	36	—
Farnuf loam, 0 to 5 percent slopes	—	35	—	48	—
Farnuf loam, 5 to 9 percent slopes	—	25	—	38	—
Farnuf loam, gravelly substratum, 0 to 5 percent slopes	—	30	—	42	—
Farnuf-Reeder loams, 2 to 5 percent slopes	—	28	—	40	—
Harlem silty clay loam	33	28	40	38	55
Harlem clay	26	23	35	35	50
Harlem clay, wet	—	—	30	—	42
Havre silty clay loam	33	30	50	45	65
Havre-Glendive complex	—	—	45	—	55
Havre-Harlem silty clays	33	25	40	38	55
Havre-Rivra complex	21	18	—	28	—
Hillon-Telstad loams, 9 to 15 percent slopes	21	18	—	26	—
Judith-Martinsdale loams, 5 to 15 percent slopes	—	15	—	28	—
Lallie silty clay	—	—	—	—	—
Lonna silt loam, 1 to 3 percent slopes	28	25	—	36	—
Lonna-Marias complex, 1 to 3 percent slopes	30	26	—	38	—
Marias clay, 1 to 9 percent slopes	35	30	—	45	—
Martinsdale loam, 1 to 5 percent slopes	—	38	—	50	—
Martinsdale-Judith loams, 1 to 5 percent slopes	—	30	—	42	—
Nishon loam	—	25	—	38	—
Parshall sandy loam, 1 to 5 percent slopes	—	20	—	30	—
Phillips loam, 0 to 5 percent slopes	30	26	—	38	—
Phillips-Elloam complex, 1 to 9 percent slopes	26	22	—	35	—
Phillips-Scobey complex, 2 to 9 percent slopes	32	28	—	40	—
Phillips-Telstad loams, 2 to 9 percent slopes	32	28	—	40	—
Phillips-Thoeny loams, 0 to 2 percent slopes	28	25	—	36	—
Redvale loam, 0 to 3 percent slopes	23	20	—	30	—
Reeder-Cambert-Doney complex, 2 to 9 percent slopes	—	25	—	38	—
Savage clay loam, 0 to 3 percent slopes	—	27	—	40	—
Scobey clay loam, 1 to 9 percent slopes	35	30	—	42	—
Tally sandy loam, 2 to 5 percent slopes	—	25	—	37	—
Tally-Dooley sandy loams, 0 to 5 percent slopes	—	27	—	40	—
Tally-Dooley sandy loams, 5 to 15 percent slopes	—	20	—	32	—
Telstad loam, 1 to 9 percent slopes	35	30	—	42	—
Thebo clay, 2 to 9 percent slopes	26	23	—	35	—
Thebo-Elloam clays, 2 to 9 percent slopes	23	20	—	30	—
Thoeny-Phillips complex, 1 to 5 percent slopes	26	23	—	33	—
Turner loam, 0 to 2 percent slopes	—	25	—	37	—
Turner and Farnuf loams, wet, 0 to 2 percent slopes	—	30	—	45	—
Williams loam, 2 to 9 percent slopes	—	35	—	48	—

[1] AUM stands for animal-unit-month: the amount of forage or feed required to maintain one animal unit (one cow, horse, or

principal crops and pasture

to the particular soil or generally is not grown on it]

Oats		Corn silage	Alfalfa	Tame grass hay		Tame pasture	
Dryland	Irrigated	Irrigated	Irrigated	Dryland	Irrigated	Dryland	Irrigated
Bu	*Bu*	*Tons*	*Tons*	*Tons*	*Tons*	*AUM* [1]	*AUM* [1]
35							
					2.0		2.5
50				1.2		1.2	
50				1.2		1.2	
46				1.2		1.2	
46				1.2		1.2	
40						1.0	
60				1.4		1.5	
48				1.1		1.2	
50				1.1		1.2	
50				1.2		1.3	
50	70	20	5.0	1.4	3.5	1.3	8.0
	60	12	4.0	1.2	3.0	1.1	5.0
	45		3.5		2.5		3.0
55	100	25	6.0	1.5	4.0	1.3	10.0
	85	18	5.5		2.8		9.0
45	70	16	5.0	1.3	3.5	1.3	6.0
32				1.0			
30						0.8	
					2.5		4.0
42				1.1		1.0	
44				1.1		1.2	
50				1.3		1.2	
60				1.5		1.6	
50				1.3		1.4	
40				1.8		1.4	
35				1.6		1.5	
45				1.1		1.1	
38							
46				1.1		1.2	
46				1.1		1.2	
40				1.0		1.1	
35				1.0		1.0	
45						1.0	
45				1.2		1.3	
50				1.1		1.2	
45				1.0		1.1	
50				1.2		1.2	
40							
50				1.2		1.2	
40							
35							
38							
45						1.0	
60				1.5		1.6	
60				1.5		1.5	

mule or five sheep or goats) for a period of 30 days.

at a depth of 15 to 24 inches. Texture of the surface, subsoil, and underlying layers is loam and clay loam. Slopes range from 1 to 15 percent. Annual precipitation is 10 to 14 inches.

On soils that are dryfarmed, one season of summer fallow is necessary to provide adequate moisture for planting. In areas that were originally in sod, two seasons of summer fallow are necessary to provide adequate moisture for planting and to control plant competition.

Trees suited to dryland planting are Russian-olive, Siberian elm, ponderosa pine, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, Tatarian honeysuckle, lilac, common chokecherry, American plum, skunkbush sumac, and silver buffaloberry.

Windbreak suitability group 2W

This group consists of deep, moderately well drained soils that have a water table at a depth of 40 to 60 inches. The available water capacity is moderate to high; permeability is moderate and moderately slow. Texture of the surface layer is loam, the subsoil is clay loam, and the underlying material is loam, clay loam, and very gravelly loamy sand. Slopes range from 0 to 2 percent. The annual precipitation is 10 to 14 inches.

When planting in areas that were originally in sod, one season of summer fallow provides adequate moisture for planting.

Trees suited to dryland planting are Russian-olive, Siberian elm, golden willow, cottonwood, ponderosa pine, Scotch pine, blue spruce, and Rocky Mountain juniper. Suitable shrubs are lilac, common chokecherry, skunkbush sumac, purple willow, silver buffaloberry, and dogwood.

Windbreak suitability group 2S

This group consists of deep, moderately well drained soils that have a seasonal water table at a depth of 4 to 6 feet during the growing season. The soils have slight and moderate salinity. The available water capacity is high; permeability is slow. Texture of the surface layer is clay and the underlying material is clay, silty clay, and silty clay loam. Slopes range from 0 to 2 percent. The annual precipitation is 10 to 14 inches.

Trees suited to dryland plantings are Russian-olive, Siberian elm, ponderosa pine, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub, common chokecherry, American plum, skunkbush sumac, silver buffaloberry, and sandcherry.

Windbreak suitability group 3M

This group consists of deep, well drained soils. The available water capacity is low; permeability is moderate to slow. The surface layer is loam, and the subsoil is clay loam. The underlying material is very gravelly sand or very gravelly loamy sand. Slopes range from 0 to 4 percent. The annual precipitation is 10 to 14 inches.

On soils that are dryfarmed, one season of summer fallow is necessary to provide adequate moisture for planting. In areas that were originally in sod, two seasons of summer fallow are necessary to provide adequate moisture for planting and to control plant competition.

Trees suited to dryland planting are Russian-olive, Siberian elm, ponderosa pine, and Rocky Mountain juniper. Suitable shrubs are Siberian peashrub and silver buffaloberry.

Windbreak suitability group 3L

This group consists of deep, well drained soils. The available water capacity is moderate; permeability is moderate. These soils have a concentrated lime layer at a depth of less than 15 inches. Texture of the surface layer is loam, and the underlying material is loam and clay loam. Slopes range from 1 to 15 percent. The annual precipitation is 10 to 14 inches.

On soils that are dryfarmed, one season of summer fallow is necessary to provide adequate moisture for planting. In areas that were originally sod, two seasons of summer fallow are necessary to provide adequate moisture for planting and to control plant competition.

Trees suited to dryland planting are the Russian-olive and Siberian elm. Suitable shrubs are Siberian peashrub and silver buffaloberry.

Windbreak suitability group 3S

This group consists mainly of deep, well drained soils. A few small areas are subject to ponding and are somewhat poorly drained. The available water capacity is high; permeability is very slow. Soils in this group have slight to moderate salinity and are moderately and strongly alkaline. The surface layer is loam to clay. The subsoil and underlying material are clay loam and clay. In most of the soils, the subsoil is dense clay, and some soils are heavy clay throughout. The dense clay subsoil or heavy clay restricts aeration, permeability, and plant root development. Slopes range from 0 to 9 percent. The annual precipitation is 10 to 14 inches.

On soils that are dryfarmed, one season of summer fallow is necessary to provide adequate moisture for planting. In areas that were originally in sod, two seasons of summer fallow are necessary to provide adequate moisture for planting and to control plant competition.

Trees suited to dryland planting are the Russian-olive and Siberian elm. Suitable shrubs are Siberian peashrub and silver buffaloberry.

Trees suited to irrigated planting are Russian-olive, Siberian elm, and cottonwood. Shrubs that are suitable are Siberian peashrub, lilac, skunkbush sumac, and silver buffaloberry.

Windbreak suitability group 4

This group consists of soils that are unsuited to windbreak plantings because of slopes of more than 15 percent or severe soil conditions. Some of these soil conditions are very low available water capacity, poor drainage, the possibility of ponding or overflow from streams, heavy dispersed clay texture, and strongly saline and alkali conditions.

Use of the soils for range[3]

About 75 percent of the acreage of Valley County is range. The vegetation consists of mainly mid and short grasses and some forbs and shrubs. The average annual

[3] ROBERT L. ROSS and BENJAMIN F. HARDIN, JR., range conservationists, Soil Conservation Service, helped prepare this section.

precipitation in the county ranges from 10 to 14 inches.

Soils that have the capacity to produce the same kinds, amounts, and proportions of range plants are grouped into range sites. A range site is the product of all environmental factors responsible for its development.

A plant community that exists within a range site and has not undergone abnormal disturbance is the potential, or climax, plant community for that site. Climax plant communities are not precise or fixed in their composition but vary, within reasonable limits, from year to year and from place to place.

Abnormal disturbance, such as overuse by livestock, excessive burning, erosion, or plowing, results in changes in the climax plant community or even complete destruction if the disturbance is drastic enough. When the range site has not deteriorated significantly under such disturbance, secondary plant succession progresses in the direction of the natural potential, or climax, plant community for the site.

Four range condition classes are used to rate the degree of departure from the potential, or climax, vegetation brought about by grazing or other uses. The classes show the present condition of the native vegetation on a range site in relation to the native vegetation that could grow there.

A range is in *excellent* condition if 76 to 100 percent of the vegetation is of the same kind as that in the climax stand. It is in *good* condition if the percentage is 51 to 75; in *fair* condition if the percentage is 26 to 50; and in *poor* condition if the percentage is less than 25.

When changes occur in the climax plant community because of grazing by livestock or other disturbance, some plant species increase, others decrease. Whether species increase or decrease depends upon the grazing animal, season of use, and the degree of use. By comparing the composition of the present plant community to the potential plant community, it is possible to see how indvidual species have increased while others have decreased. Plants that were not present in the climax community but that show up in the present plant community are invaders of the site.

The composition of climax and present plant communities, together with other range site information, provide the basis for selecting range management systems.

Management programs usually try to increase desirable plants and restore the range to as near climax condition as possible. Some programs are designed to create or maintain plant communities somewhat removed from the climax plant community to fit specific needs in the grazing program, to provide for wildlife habitat, or for other benefits. Any management objective should be compatible with conservation objectives.

In the following pages, the 15 range sites in Valley County are briefly described and the climax plants and principal invaders on the sites are named. Also given is an estimate of the potential annual yield on ranges in excellent condition for favorable and unfavorable seasons. These yields are given as the normal high and low rather than the extremes. Yields are the total annual yield of air-dry herbage per acre, including the leaves, stems, twigs, and fruit of all plants on the site. Not all of this herbage is usable by livestock. The soils in each site can be determined by referring to the "Guide to Map Units" at the back of this soil survey.

Wetland range site

This range site consists of deep, poorly drained soils on low stream terraces and flood plains. In some places the soils are subject to ponding during part of the year. Some have a water table within a depth of 36 inches during most of the growing season. Slopes range from 0 to 5 percent. The soils have a loam to clay surface layer and underlying material. Permeability is slow and moderately slow.

Approximate species composition of the climax, or potential, plant community is 30 percent prairie cordgrass, 20 percent bluejoint reedgrass, 10 percent reed canarygrass, 25 percent sedges, and 15 percent perennial and annual forbs.

If this site is in excellent condition, and moisture conditions are favorable, production is approximately 6,000 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 5,000 pounds per acre. Approximately 95 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, prairie cordgrass, bluejoint reedgrass, and sedges decline and sloughgrass, reed canarygrass, and forbs increase to replace them. If overgrazing continues, annuals and exotics invade the site.

Because of wetness, mechanical methods or grass seedings are not feasible without installing a drainage system. Some of the soils could be drained and grass could be seeded, if stream overflow, flooding, and erosion are controlled while grass is being established.

Subirrigated range site

This range site consists of deep, somewhat poorly drained and moderately well drained soils on bottom lands and low stream terraces. The water table is at a depth of 24 to 60 inches during the growing season. Slopes range from 0 to 5 percent. The soils mainly have a loam or clay loam surface layer, subsoil, and underlying material. In some areas the underlying material is very gravelly loamy sand. Permeability is moderate in the surface layer and moderately slow to very rapid in the underlying material.

Approximate species composition of the climax, or potential, plant community is 25 percent switchgrass; 20 percent prairie cordgrass; 10 percent each northern reedgrass, bluejoint reedgrass, and western wheatgrass; 15 percent sedges; and 5 percent each shrubs and forbs.

If this site is in excellent condition and moisture conditions are favorable, production is approximately 5,000 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 3,500 pounds per acre. Approximately 95 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, switchgrass, prairie cordgrass, northern reedgrass, bluejoint reedgrass, and some sedges decline. Western wheatgrass, less desirable sedges, forbs, and shrubs increase to replace them. If overgrazing continues, Kentucky bluegrass, Canada bluegrass, and annuals invade the site.

Grass seedings are feasible on this site if care is used to control stream overflow, flooding, and erosion.

Saline Lowland range site

Aquic Ustifluvents, saline, are the only soils in this range site. They are deep, somewhat poorly drained, saline soils on low stream terraces, flood plains, and fans in stream valleys. The water table is at a depth of 40 to 60 inches during most of the growing season. Slopes range from 0 to 3 percent. The soils have a clay loam or clay surface layer and underlying material. Permeability is moderately slow to slow. Salinity is moderate to strong.

Approximate species composition of the climax, or potential, plant community is 20 percent each alkali cordgrass and western wheatgrass; 15 percent Nuttall alkaligrass; 10 percent each alkali sacaton, saltgrass, and forbs; and 5 percent each basin wildrye, mat muhly, and greasewood.

If this site is in excellent condition and moisture conditions are favorable, production is approximately 2,000 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 700 pounds per acre. Approximately 85 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, alkali cordgrass, Nuttall alkaligrass, and alkali sacaton decline and western wheatgrass, saltgrass, and forbs increase to replace them. If overgrazing continues, most of these sites become dominated by saltgrass, greasewood, foxtail barley, and annuals.

Without drainage or some other treatment, reseeding this site would be very difficult.

Overflow range site

This range site consists of deep, well drained to somewhat poorly drained soils. The soils are on bottom lands along intermittent streams and in low areas on uplands where runoff is slow. They have loam to clay surface and underlying layers. Slopes range from 0 to 5 percent. Permeability is very slow to moderate. These soils receive runoff water from surrounding slopes. Some soils along streams are subject to annual flooding.

Approximate species composition of the climax, or potential, plant community is 50 percent western wheatgrass; 15 percent basin wildrye; 5 percent slender wheatgrass, and 10 percent each green needlegrass, other grasses, and forbs.

If this site is in excellent condition and moisture conditions are favorable, production is approxmately 2,000 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 1,200 pounds per acre. Approximately 95 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, basin wildrye, green needlegrass, and desirable forbs are almost eliminated and are replaced by Kentucky bluegrass and foxtail barley. In some areas western wheatgrass increases. If overgrazing continues, Canada bluegrass, saltgrass, foxtail barley, snowberry, and annual forbs and grasses invade the site.

Seeding grass is feasible on this site if care is used to prevent flooding and erosion while grass is being established.

Sands range site

Lihen loamy fine sand, 2 to 9 percent slopes, is the only soil in this range site. It is a deep, well drained soil in the uplands. It has a loamy fine sand surface layer and underlying material. Permeability is rapid.

Approximate species composition of the climax, or potential, plant community is 20 percent prairie sandreed; 15 percent each little bluestem, needleandthread, and forbs; and 5 percent each Indian ricegrass, sand bluestem, sand dropseed, western wheatgrass, junegrass, threadleak sedge, and wildrose and skunkbush.

If this site is in excellent condition and moisture is favorable, production is approximately 1,600 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 1,000 pounds per acre. Approximately 95 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, prairie sandreed, little bluestem, Indian ricegrass, sand bluestem, and forbs decline. Needleandthread, sand dropseed, and threadleaf sedge are the main species that replace them. Over a period of several years of overgrazing, fringed sagewort, needleleaf sedge, sandwort, weedy forbs, and annual weedy grasses invade the site.

Because of the extreme erosion hazard, range condition is easier to improve by proper grazing management than by mechanical methods.

Sandy range site

This range site consists of deep, well drained soils in the uplands. Slopes range from 0 to 15 percent. The soils have a sandy loam surface layer and a sandy loam and sandy clay loam subsoil. The underlying material ranges from sand to clay. Permeability is moderate or moderately rapid.

Approximate species composition of the climax, or potential, plant community is 30 percent needleandthread; 15 percent each prairie sandreed, little bluestem, and forbs; 10 percent each western wheatgrass and threadleaf sedge; and 5 percent blue grama.

If this site is in excellent condition and moisture is favorable, production is approximately 1,500 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 900 pounds per acre. Approximately 95 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, prairie sandreed and little bluestem decline and needleandthread, western wheatgrass, blue grama, threadleaf sedge, and forbs increase to replace them. If overgrazing continues, needleleaf sedge, fringed sagewort, weedy forbs, and annuals invade the site.

Mechanical practices and grass seedings are feasible on this site, if caution is used to prevent wind erosion.

Silty range site

This range site consists of moderately deep to deep, well drained soils on uplands. Slopes range from 0 to 25 percent. The soils have a loam and silt loam surface layer and a loam to clay subsoil. A small acreage has a clay loam surface layer. The underlying material is mainly loam or clay loam, but in some areas it is very gravelly loamy sand. Permeability is moderate to slow.

Some soils have soft sandstone bedrock below depths of 20 to 40 inches.

Approximate species composition of the climax, or potential, plant community is 35 percent needleandthread and porcupinegrass; 25 percent western wheatgrass; 15 percent blue grama, prairie junegrass, and Sandberg bluegrass; 5 percent each green needlegrass, bluebunch wheatgrass, and silver sagebrush; and 10 percent forbs.

If this site is in excellent condition and moisture conditions are favorable, production is approximately 1,500 pounds of air-dry herbage per acre. In less favorable years, production drops to as low as 700 pounds per acre. Approximately 95 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, bluebunch wheatgrass, green needlegrass, and porcupinegrass decrease. They are replaced by needleandthread, forbs, and big sagebrush. If overgrazing continues, blue grama, prairie junegrass, Sandberg bluegrass, big sagebrush, and annuals invade the site.

Except on steep slopes this site can be mechanically worked, and grass seedings are feasible.

Clayey range site

This range site consists of deep soils on flood plains and fans and moderately deep to deep soils on uplands. Slopes range from 0 to 15 percent. The soils have a clay loam to clay surface layer and loam to clay underlying material. Permeability is moderately slow or slow. Some soils have clay shale below a depth of 20 to 40 inches.

Approximate species composition of the climax, or potential, plant community is 35 percent western wheatgrass; 20 percent green needlegrass; 10 percent bluebunch wheatgrass and blue grama; 10 percent prairie junegrass and Sandberg bluegrass; 5 percent each plains muhly and big sagebrush; and 15 percent forbs.

If this site is in excellent condition and moisture conditions are favorabe, production is approximately 1,100 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 800 pounds per acre. Approximately 95 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, green needlegrass and bluebunch wheatgrass decrease. Western wheatgrass, blue grama, Sandberg bluegrass, forbs, and big sagebrush replace them. If overgrazing continues, big sagebrush, pricklypear cactus, broom snakeweed, weeds, and annuals invade the site.

This site can be mechanically worked and grass can be seeded.

Thin Hilly range site

This range site consists of deep and moderately deep, well drained soils on hills in the uplands. Slopes range from 9 to 35 percent. The soils have a loam, silt loam, and clay loam surface layer, subsoil, and underlying material. Some of the soils have a gravelly surface layer. In some areas the soils have soft sandstone and siltstone at depths of 20 to 40 inches. Permeability is moderate to slow.

Approximate species composition of the climax, or potential, plant community is 30 percent bluebunch wheatgrass; 20 percent each western wheatgrass and needleandthread; 15 percent little bluestem; 10 percent forbs; and 5 percent sedges.

If this site is in excellent condition and moisture conditions are favorable, production is approximately 1,000 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 500 pounds per acre. Approximately 95 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, bluebunch wheatgrass and little bluestem decline and western wheatgrass, needleandthread, and forbs increase to replace them. If overgrazing continues, sedges, shortgrasses, annuals, and weeds invade the site.

The slopes prevent any use of machinery for reseeding.

Shalow Clay range site

This range site consists of shallow, well drained soils in the uplands. Slopes range from 8 to 35 percent. The soils have a clay surface layer and underlying material. They have clay shale at a depth of less than 20 inches. Permeability is slow. Shale outcrops are present in some places.

Approximate species composition of the climax, or potential, plant community is 25 percent western wheatgrass; 15 percent each bluebunch wheatgrass and green needlegrass; 10 percent plains muhly; 5 percent each bluegrama and big sagebrush; 3 percent Sandberg bluegrass; 2 percent plains reedgrass; and 20 percent forbs.

If this site is in excellent condition and moisture conditions are favorable, production is approximately 900 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 400 pounds per acre. Approximately 90 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, bluebunch wheatgrass, green needlegrass, and some forbs decrease and western wheatgrass, blue grama, Sandberg bluegrass, less desirable forbs, and big sagebrush increase to replace them. If overgrazing continues, sagebrush, plains pricklypear, weeds, and annuals invade the site.

On slopes of less than 10 percent, using machinery and seeding grass are feasible. Some of the soils tend to seal over and present a problem for new seeding.

Shallow to Gravel range site

Rivra clay loam, in map unit Havre-Rivra complex, is the only soil in this range site. It is a deep, well drained soil on low stream terraces. Slopes range from 0 to 2 percent. The soil has a clay loam surface layer and very gravelly loamy sand underlying material. Permeability is moderate in the surface layer and rapid or very rapid in the underlying material. The soils are 60 to 75 percent gravel and cobble fragments in the underlying material.

Approximate species composition of the climax, or potential, plant community is 25 percent needleandthread; 20 percent western wheatgrass; 15 percent bluebunch wheatgrass; 10 percent each blue grama, sand dropseed, and forbs; and 5 percent each prairie junegrass and threadleaf sedges.

If this site is in excellent condition and moisture

conditions are favorable, production is approximately 750 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 400 pounds per acre. Approximately 95 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, needleandthread, bluebunch wheatgrass, western wheatgrass and some forbs decline and blue grama, sand dropseed, threadleaf sedge, and less desirable forbs increase to replace them. If overgrazing continues, cactus, red threeawn, cheatgrass, and other annuals invade the site.

Using machinery and grass seeding are feasible on this site.

Shallow range site

Cabbart loam, in map unit Cabbart-Delpoint complex, 9 to 35 percent slopes, is the only soil in this range site. It consists of a shallow, well drained soil on hills and ridges on uplands. The soil has a loam surface layer and underlying material. Sandstone bedrock is at a depth of less than 20 inches. Permeability is moderate. Rock outcrop and small areas of sandy loam soils are present in some places.

Approximate species composition of the climax, or potential, plant community is 25 percent bluebunch wheatgrass; 20 percent needleandthread; 15 percent little bluestem; 10 percent each western wheatgrass and forbs; and 5 percent each plains muhly, blue grama, junegrass, and Sandberg bluegrass.

If this site is in excellent condition and moisture conditions are favorable, production is 900 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 400 pounds per acre. Approximately 95 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, bluebunch wheatgrass, needleandthread, and little bluestem decline and western wheatgrass, blue grama, junegrass, Sandberg bluegrass, and forbs increase to replace them. If overgrazing continues cheatgrass, rabbitbrushes, plains pricklypear, broom snakeweed, weeds, and annuals invade the site.

Because of the steepness of the slope, this site is not suitable for machinery, and grass seedings are generally not feasible.

Dense Clay range site

This range site consists of deep, well drained soils on fans, terraces, and uplands. Slopes range from 0 to 15 percent. The soils have a loam to clay surface layer and a dense clay subsoil. Where the surface layer is loam, it is less than 8 inches thick. If the surface is clay, soil particles adhere together and the surface is crusted. The underlying material is clay loam or clay. Permeability is very slow.

Approximate species composition of the climax, or potential, plant community is 45 percent western wheatgrass; 10 percent each green needlegrass and forbs; 5 percent each Sandberg bluegrass, saltgrass, big sagebrush, and greasewood; and 15 percent Nuttall saltbush.

If the site is in excellent condition and moisture conditions are favorable, production is approximately 800 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 250 pounds per acre. Approximately 95 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, western wheatgrass, green needlegrass, and Nuttall saltbush decrease and Sandberg bluegrass, saltgrass, forbs, and big sagebrush increase to replace them.

If overgrazing continues, plains pricklypear, broom snakeweed, weeds, and annuals invade the site.

Seeding grass is not easy because the seedbed is difficult to prepare and the surface is crusted, but seeding is feasible. Mechanical practices can be applied on this site.

Gravel range site

Tinsley very gravelly sandy loam is the only soil in this range site. It is deep, excessively drained soil on hills in the uplands. Slopes range from 9 to 35 percent. The soil has a very gravelly sandy loam surface layer and very gravelly sand underlying material that is about 60 percent gravel fragments. Permeability is rapid.

Approximate species composition of the climax, or potential, plant community is 35 percent needleandthread; 20 percent western wheatgrass; 10 percent each plains muhly and blue grama; 5 percent each Sandberg bluegrass and shrubs; and 15 percent forbs.

If this site is in excellent condition and moisture conditions are favorable, production is approximately 450 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 200 pounds per acre. Approximately 90 percent of this production is forage for cattle, sheep, and wildlife.

Under continued heavy grazing, western wheatgrass and needleandthread decrease. Plains muhly, blue grama, Sandberg bluegrass, forbs, and shrubs increase to replace them. If overgrazing continues, cheatgrass and other annuals invade the site.

Because of the high percentage of gravel in the soil and the steep slopes, using machinery and seeding grass are not feasible.

Saline Upland range site

Nobe clay is the only soil in this range site. It is deep, moderately well drained, saline soil on fans and terraces in the uplands. Slopes range from 0 to 5 percent. The soil has a clay loam to clay surface layer, subsoil, and underlying material. Permeability is very slow. The soil is moderately to very strongly saline.

Approximate species composition of the climax, or potential, plant community is 25 percent western wheatgrass; 20 percent Nuttall saltbush; 15 percent each alkali sacaton and greasewood; 10 percent each inland saltgrass and forbs; and 5 percent Sandberg bluegrass.

If this site is in excellent condition and moisture conditions are favorable, production is approximately 350 pounds of air-dry herbage per acre per year. In less favorable years, production drops to as low as 150 pounds per acre. Approximately 90 percent of this production is forage for cattle, sheep, and wildlife.

Under continuous heavy grazing, Nuttall saltbush, western wheatgrass, and alkali sacaton decrease. Plains reedgrass, Sandberg bluegrass, and forbs increase to replace them. If overgrazing continues, cactus, foxtail

barley, squirreltail, cheatgrass, and other annuals invade the site. Much bare ground is apparent.

The high salt content precludes the use of machinery or grass seeding.

Use of the soils for wildlife habitat[4]

The soils, topography, climate, and patterns of native and introduced vegetation combine to favor habitat for a variety of game and nongame species in Valley County. The principal game animals include white-tailed deer, mule deer, elk, pronghorn antelope, ring-necked pheasant, gray partridge, sharp-tailed grouse, and sage grouse. Furbearers in the county are beaver, muskrat, red fox, skunks, and mink. Predators include the coyote and bobcat. Numerous species of nongame mammals and birds also inhabit the county.

Some ponds and lakes are stocked with trout, and the Missouri and Milk Rivers provide excellent fishing. Several species of fish occur in Ft. Peck reservoir, which affords excellent opportunities for angling throughout the year. Ducks and geese use the lakes and the streams during their spring and fall migration.

Successful management of any tract of land for wildlife requires, among other things, that food, cover, and water be available in a suitable combination. Lack of any one of these necessities, unfavorable balance between them, or poor distribution of them may severely limit or account for the absence of desired wildlife species. Soil information provides a valuable tool in creating, improving, or maintaining suitable food, cover, and water for wildlife.

Most wildlife habitat is managed by planting suitable vegetation, by manipulating existing vegetation to bring about natural establishment, by increasing or improving desired plants, or by combinations of such practices. The influence of a soil on the growth of plants is known for many species. It can be predicted for other plants from knowledge about the characteristics and behavior of the soil. In addition, water areas can be created or natural ones improved for wildlife habitat.

Soil interpretations for wildlife habitat serve a variety of purposes. They aid in selecting the most suitable sites for wildlife habitat. They indicate the intensity of management required to achieve satisfactory results. They also indicate why it may not be feasible to manage a particular area for a given species of wildlife.

These interpretations also help in broad-scale planning of wildlife management areas, parks, and nature areas or for acquiring wildlife lands.

In table 3 the soils in the survey area are rated according to their potential for wildlife habitat, and not how they may be influenced by adjoining soils. Other environmental influences on habitat, such as elevation and aspect, must be evaluated by onsite appraisal.

Soils directly influence the variety and amount of vegetation a given area supports; therefore, they directly influence the kind and number of wildlife that inhabit an area. Soil properties that affect the growth of wildlife habitat are: (1) depth of soil useful for growing crops, (2) surface layer texture, (3) available water holding capacity, (4) wetness, (5) surface stoniness or rockiness, (6) flood hazard, (7) slope, and (8) permeability to air and water.

In table 3 soils of Valley County are rated for their potential to produce six elements of wildlife habitat and for their potential as habitat for three groups, or kinds, of wildlife. The ratings indicate relative suitability and are expressed by an adjective as follows:

A rating of *good* means the habitat is easily improved, maintained, or created. There are few or no soil limitations in habitat management, and satisfactory results can be expected. A rating of *fair* means the habitat can be improved, maintained, or created on these soils, but moderate soil limitations affect habitat management or development. A moderate intensity of management and fairly frequent attention may be required to ensure satisfactory results. A rating of *poor* means the habitat can be improved, maintained, or created on these soils, but the soil limitations are severe. Habitat management may be difficult and expensive and may require intensive effort. Results are questionable. A rating of *very poor* means that under the prevailing soil conditions, it is impractical to attempt to improve, maintain, or create habitat. Unsatisfactory results are probable.

The definition of each heading and subheading in table 3 is given in the following paragraphs:

Potential for habitat elements. Each soil is rated according to its suitability for producing various kinds of plants and other elements that make up wildlife habitat. The ratings mainly take into account the characteristics of the soils and closely related natural features of the environment. They do not take into account climate, present use of soils, or present distribution of wildlife and people. For this reason, selection of sites for development as habitat for wildlife requires onsite inspection.

Grain and seed crops. These crops are annual, grain-producing plants such as wheat, barley, and oats.

Grasses and legumes. Making up this group are domestic grasses and legumes that are established by planting. They provide food and cover for wildlife. Grasses include tall wheatgrass, crested wheatgrass, and pubescent wheatgrass. Legumes include alfalfa, birdsfoot trefoil, and sweetclover.

Native upland plants. This group consists of native or introduced perennial grasses, forbs, and weeds that provide food and cover for upland wildlife. Important plants are western wheatgrass, bluebunch wheatgrass, green needlegrass, needleandthread, blue grama, little bluestem, prairie sandreed, fringed sagewort, dotted gayfeather, scurfpea, cudweed sagewort, western yarrow, winterfat, American vetch, and cheatgrass.

Shrubs. These plants produce buds, twigs, bark, or foliage used as food by wildlife; they also provide cover and shade for some wildlife species. Typical plants in this category are big sagebrush, silver sagebrush, rabbitbrush, greasewood, Nuttall saltbrush, juniper, rose, and skunkbrush sumac.

Wetland plants. In this group are annual and perennial herbaceous plants that grow wild on moist and wet sites. They furnish food and cover mostly for wetland wildlife. Typical examples of plants are smartweed, sedges, rushes, barnyardgrass, and cattails. Submerged and floating aquatics are not included in this category.

Shallow water areas. Areas covered by water to an

[4] RONALD F. BATCHELOR, biologist, Soil Conservation Service, helped prepare this section.

TABLE 3.—*Wildlife habitat potentials*

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of entry indicates soil was not rated]

Map unit and symbol	Potential for habitat elements						Potential as habitat for—		
	Grain and seed crops	Grasses and legumes	Native upland plants	Shrubs	Wetland plants	Shallow water areas	Open-land wildlife	Rangeland wildlife	Wet-land wildlife
1. Absher-Vaeda complex, 1 to 5 percent slopes:									
Absher clay loam	Poor	Poor	Poor	Poor			Poor	Poor	
Vaeda silty clay	Poor	Poor	Very poor	Very poor			Poor	Very poor	
2. Aquic Ustifluvents, saline			Very poor	Very poor	Poor	Poor		Very poor	Poor.
3. Attewan loam, 0 to 4 percent slopes	Fair	Fair	Fair	Fair			Fair	Fair	
4. Badland			Very poor	Very poor				Very poor	
5. Bowdoin clay	Poor	Poor	Poor	Poor			Poor	Poor	
6. Cabbart-Delpoint complex, 9 to 35 percent slopes:									
Cabbart loam			Fair	Fair				Fair	
Delpoint loam			Fair	Fair				Fair	
7. Elloam clay loam, 1 to 5 percent slopes	Poor	Poor	Poor	Poor			Poor	Poor	
8. Elloam gravelly clay, 2 to 9 percent slopes	Poor	Poor	Poor	Poor			Poor	Poor	
9. Elloam-Sunburst clay loams, 9 to 35 percent slopes:									
Elloam clay loam	Poor	Poor	Poor	Poor			Poor	Poor	
Sunburst clay loam	Poor	Fair	Fair	Fair			Fair	Fair	
10. Evanston loam, 0 to 2 percent slopes	Fair	Good	Fair	Fair			Fair	Fair	
11. Evanston loam, 2 to 9 percent slopes	Fair	Good	Fair	Fair			Fair	Fair	
12. Evanston loam, sandstone substratum, 2 to 5 percent slopes	Fair	Good	Fair	Fair			Fair	Fair	
13. Evanston-Lonna loams, 2 to 9 percent slopes:									
Evanston loam	Fair	Good	Fair	Fair			Fair	Fair	
Hillon loam	Fair	Good	Fair	Fair			Fair	Fair	
14. Evanston-Marias complex, 3 to 9 percent slopes:									
Evanston loam	Fair	Good	Fair	Fair			Fair	Fair	
Marias clay	Fair	Fair	Poor	Poor			Fair	Poor	
15. Evanston-Marmarth loams, 3 to 12 percent slopes:									
Evanston loam	Fair	Good	Fair	Fair			Fair	Fair	
Marmarth loam	Fair	Good	Fair	Fair			Fair	Fair	
16. Farnuf loam, 0 to 5 percent slopes	Fair	Good	Good	Good			Good	Good	
17. Farnuf loam, 5 to 9 percent slopes	Fair	Good	Good	Good			Good	Good	

TABLE 3.—*Wildlife habitat potentials*—Continued

Map unit and symbol	Potential for habitat elements						Potential as habitat for—		
	Grain and seed crops	Grasses and legumes	Native upland plants	Shrubs	Wetland plants	Shallow water areas	Open-land wildlife	Rangeland wildlife	Wetland wildlife
18. Farnuf loam, gravelly substratum, 0 to 5 percent slopes	Fair	Good	Good	Good			Good	Good	
19. Farnuf-Reeder loams, 2 to 5 percent slopes:									
Farnuf loam	Fair	Good	Good	Good			Good	Good	
Reeder loam	Fair	Good	Good	Good			Good	Good	
20. Farnuf-Tinsley-Reeder association, hilly:									
Farnuf loam	Fair	Fair	Good	Good			Fair	Good	
Tinsley very gravelly sandy loam	Very poor	Very poor	Poor	Poor			Very poor	Poor	
Reeder loam	Fair	Fair	Good	Good			Fair	Good	
21. Fluvaquentic Haploborolls, gently sloping			Good	Good	Fair	Fair		Good	Fair.
22. Harlem silty clay loam	Fair	Fair	Fair	Fair			Fair	Fair	
23. Harlem clay	Fair	Fair	Poor	Poor			Fair	Poor	
24. Harlem clay, wet	Fair	Fair	Poor	Poor			Fair	Poor	
25. Havre silty clay loam	Fair	Good	Fair	Fair			Fair	Fair	
26. Havre-Glendive complex:									
Havre silty clay loam	Fair	Good	Fair	Fair			Fair	Fair	
Glendive loam	Fair	Good	Fair	Fair			Fair	Fair	
27. Havre-Harlem silty clays:									
Havre silty clay	Fair	Fair	Poor	Poor			Fair	Poor	
Harlem silty clay	Fair	Fair	Poor	Poor			Fair	Poor	
28. Havre-Rivra complex:									
Havre clay loam	Fair	Good	Fair	Fair			Fair	Fair	
Rivra clay loam	Poor	Poor	Poor	Poor			Poor	Poor	
29. Hillon loam, 15 to 35 percent slopes			Fair	Fair				Fair	
30. Hillon-Telstad loams, 9 to 15 percent slopes:									
Hillon loam	Fair	Good	Fair	Fair			Fair	Fair	
Telstad loam	Fair	Good	Fair	Fair			Fair	Fair	
31. Judith-Martinsdale loams, 5 to 15 percent slopes:									
Judith loam	Fair	Good	Good	Good			Good	Good	
Martinsdale loam	Fair	Good	Good	Good			Good	Good	
32. Lallie silty clay	Fair	Fair	Poor	Fair	Good	Good	Fair	Poor	Good.
33. Lihen loamy fine sand, 2 to 9 percent slopes	Poor	Fair	Good	Good			Fair	Good	
34. Lisam-Dilts clays, 5 to 35 percent slopes:									
Lisam clay			Poor	Poor				Poor	
Dilts clay			Poor	Poor				Poor	

TABLE 3.—*Wildlife habitat potentials*—Continued

Map unit and symbol	Potential for habitat elements						Potential as habitat for—		
	Grain and seed crops	Grasses and legumes	Native upland plants	Shrubs	Wetland plants	Shallow water areas	Open-land wildlife	Rangeland wildlife	Wet-land wildlife
35. Lisam-Dilts-Rock outcrop complex, 9 to 35 percent slopes:									
Lisam clay			Poor	Poor				Poor	
Dilts clay			Poor	Poor					
Rock outcrop									
36. Lonna silt loam, 1 to 3 percent slopes	Fair	Good	Fair	Fair			Fair	Fair	
37. Lonna-Marias complex, 1 to 3 percent slopes:									
Lonna silt loam	Fair	Good	Fair	Fair			Fair	Fair	
Marias clay	Fair	Fair	Poor	Poor			Fair	Poor	
38. Marias clay, 1 to 9 percent slopes	Fair	Fair	Poor	Poor			Fair	Poor	
39. Marmarth-Cabbart loams, 5 to 25 percent slopes:									
Marmarth loam	Poor	Fair	Fair	Fair			Fair	Fair	
Cabbart loam	Poor	Fair	Fair	Fair			Fair	Fair	
40. Martinsdale loam, 1 to 5 percent slopes	Fair	Good	Good	Good			Good	Good	
41. Martinsdale-Judith loams, 1 to 5 percent slopes:									
Martinsdale loam	Fair	Good	Good	Good			Good	Good	
Judith loam	Fair	Good	Good	Good			Good	Good	
42. Nishon loam	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
43. Nobe clay			Very poor	Very poor				Very poor	
44. Nobe-Absher complex, 0 to 3 percent slopes:									
Nobe clay			Very poor	Very poor				Very poor	
Absher clay loam			Poor	Poor				Poor	
45. Parshall sandy loam, 1 to 5 percent slopes	Fair	Good	Good	Good			Good	Good	
46. Phillips loam, 0 to 5 percent slopes	Fair	Good	Fair	Fair			Fair	Fair	
47. Phillips-Elloam complex, 1 to 9 percent slopes:									
Phillips loam	Fair	Good	Fair	Fair			Fair	Fair	
Elloam clay loam	Poor	Poor	Poor	Poor			Poor	Poor	
48. Phillips-Nobe-Absher complex, 1 to 5 percent slopes:									
Phillips loam			Fair	Fair				Fair	
Nobe clay			Very poor	Very poor				Very poor	
Absher clay loam			Poor	Poor				Poor	
49. Phillips-Scobey complex, 2 to 9 percent slopes:									
Phillips loam	Fair	Good	Fair	Fair			Fair	Fair	
Scobey clay loam	Fair	Good	Fair	Fair			Fair	Fair	

TABLE 3.—*Wildlife habitat potentials*—Continued

Map unit and symbol	Potential for habitat elements						Potential as habitat for—		
	Grain and seed crops	Grasses and legumes	Native upland plants	Shrubs	Wetland plants	Shallow water areas	Open-land wildlife	Rangeland wildlife	Wetland wildlife
50. Phillips-Telstad loams, 2 to 9 percent slopes:									
Phillips loam	Fair	Good	Fair	Fair			Fair	Fair	
Telstad loam	Fair	Good	Fair	Fair			Fair	Fair	
51. Phillips-Thoeny loams, 0 to 2 percent slopes:									
Phillips loam	Fair	Good	Fair	Fair			Fair	Fair	
Thoeny loam	Poor	Poor	Poor	Poor			Poor	Poor	
52. Redvale loam, 0 to 3 percent slopes	Fair	Fair	Fair	Fair			Fair	Fair	
53. Reeder-Cambert-Doney complex, 2 to 9 percent slopes:									
Reeder loam	Fair	Good	Good	Good			Good	Good	
Cambert silt loam	Fair	Good	Good	Good			Good	Good	
Doney loam	Fair	Good	Good	Good			Good	Good	
54. Reeder-Doney-Cambert complex, 9 to 35 percent slopes:									
Reeder loam	Fair	Fair	Good	Good			Fair	Good	
Doney loam	Poor	Fair	Good	Good			Fair	Good	
Cambert silt loam	Poor	Fair	Good	Good			Fair	Good	
55. Rock outcrop			Very poor	Very poor				Very poor	
56. Savage clay loam, 0 to 3 percent slopes	Fair	Fair	Fair	Fair			Fair	Fair	
57. Scobey clay loam, 1 to 9 percent slopes	Fair	Good	Fair	Fair			Fair	Fair	
58. Scobey stony clay loam, 2 to 15 percent slopes	Poor	Poor	Fair	Fair			Poor	Fair	
59. Scobey-Sunburst clay loams, 5 to 25 percent slopes:									
Scobey clay loam	Fair	Fair	Fair	Fair			Fair	Fair	
Sunburst clay loam	Poor	Fair	Fair	Fair			Fair	Fair	
60. Sunburst clay loam, 9 to 35 percent slopes	Poor	Fair	Fair	Fair			Fair	Fair	
61. Sunburst-Lisam complex, 9 to 35 percent slopes:									
Sunburst clay loam			Fair	Fair				Fair	
Lisam clay			Poor	Poor				Poor	
62. Tally sandy loam, 2 to 5 percent slopes	Fair	Good	Good	Good			Good	Good	
63. Tally-Dooley sandy loams, 0 to 5 percent slopes:									
Tally sandy loam	Fair	Good	Good	Good			Good	Good	
Dooley sandy loam	Fair	Good	Good	Good			Good	Good	
64. Tally-Dooley sandy loams, 5 to 15 percent slopes:									
Tally sandy loam	Fair	Good	Good	Good			Good	Good	
Dooley sandy loam	Fair	Good	Good	Good			Good	Good	

TABLE 3.—*Wildlife habitat potentials*—Continued

Map unit and symbol	Potential for habitat elements						Potential as habitat for—		
	Grain and seed crops	Grasses and legumes	Native upland plants	Shrubs	Wetland plants	Shallow water areas	Open-land wildlife	Rangeland wildlife	Wetland wildlife
65. Telstad loam, 1 to 9 percent slopes	Fair	Good	Fair	Fair			Fair	Fair	
66. Thebo clay, 2 to 9 percent slopes	Fair	Fair	Poor	Poor			Fair	Poor	
67. Thebo-Elloam clays, 2 to 9 percent slopes:									
Thebo clay	Fair	Fair	Poor	Poor			Fair	Poor	
Elloam clay	Poor	Poor	Poor	Poor			Poor	Poor	
68. Thebo-Lisam clays, 2 to 15 percent slopes:									
Thebo clay			Poor	Poor				Poor	
Lisam clay			Poor	Poor				Poor	
69. Thoeny-Phillips complex, 1 to 5 percent slopes:									
Thoeny loam	Poor	Poor	Poor	Poor			Poor	Poor	
Phillips loam	Fair	Good	Fair	Fair			Fair	Fair	
70. Tinsley complex, 9 to 35 percent slopes			Poor	Poor				Poor	
71. Tinsley-Reeder-Doney complex, 9 to 35 percent slopes:									
Tinsley very gravelly sandy loam			Poor	Poor				Poor	
Reeder loam			Good	Good				Good	
Doney loam			Good	Good				Good	
72. Turner loam, 0 to 2 percent slopes	Fair	Good	Good	Good			Good	Good	
73. Turner and Farnuf loams, wet, 0 to 2 percent slopes:									
Turner loam, wet	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Farnuf loam, wet	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
74. Typic Fluvaquents, gently sloping			Fair	Fair	Fair	Fair		Fair	Fair.
75. Ustic Torrifluvents, gently sloping			Fair	Fair				Fair	
76. Vaeda silty clay	Poor	Poor	Very poor	Very poor			Poor	Very poor	
77. Williams loam, 2 to 9 percent slopes	Fair	Good	Good	Good			Good	Good	

average depth of less than 5 feet are useful to wildlife. They may be naturally wet areas or those created by dams or levees or by water-control devices in marshes or streams. Typical examples are waterfowl feeding areas, wildlife watering developments, wildlife ponds, and beaver ponds.

Potential as habitat for kinds of wildlife. Table 3 rates soils according to their suitability as habitat for the three kinds of wildlife in the county—openland, rangeland, and wetland wildlife. These ratings are related to the ratings of the elements of habitat. For example, soils rated as *poor* for shallow water areas are rated *poor* for wetland wildlife.

Open-land wildlife. Birds and mammals of croplands, pasture, meadows, lawns, and areas overgrown with grasses, herbs, shrubs, and vines. Examples are gray partridge, pheasant, meadowlark, sparrows, cottontail rabbit, white-tailed deer, and red fox.

Rangeland wildlife. Birds and mammals of natural range. Examples are sharp-tailed grouse, sage grouse, meadowlark, lark bunting, horned lark, upland plover, curlew, pronghorn antelope, mule deer, and elk.

Wetland wildlife. Birds and mammals of swampy, marshy, or open-water areas. Examples are ducks, geese, herons, killdeer, rails, kingfishers, muskrat, mink, and beaver.

Engineering uses of the soils[5]

This section provides information about the use of soils as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissioners, town and city managers, land developers, engineers, contractors, and farmers.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

Most of the information in this section is presented in Tables 4, 5, and 6, which show respectively, for each kind of soil, several estimated soil properties significant to engineering, interpretations for various engineering uses, and interpretations of soils for town and country planning.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Engineering classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO).

The Unified system (*2*) classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification system for example, CL–ML.

The AASHTO system (*1*) classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A–1 are coarse grained and low in content of fines. At the other extreme, in group A–7, are fine-grained soils. Highly organic soils are classified in group A–8 on the basis of visual inspection.

The estimated AASHTO and Unified classifications are given in Table 4 for all soils mapped in the survey area.

Soil properties significant in engineering

Table 4 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 4 gives information for each of these contrasting horizons in a typical profile. Depth to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is

[5] FORREST E. BERG, engineer, Soil Conservation Service, assisted in preparation of this section.

TABLE 4.—*Physical and chemical*

[An asterisk in the first column indicates that at least one map unit in this series is made up of two or more kinds of soil. The instructions for referring to other series that appear in the first column of

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal water table			Unified	AASHTO
	Inches	*Feet*	*Inches*			
*Absher: 1 For properties of Vaeda part of 1, see Vaeda series.	>60	>6.0	0–2 2–14 14–60	Loam Clay Clay loam	CL CL or CH CL	A–6 A–7 A–6 or A–7
Aquic Ustifluvents, saline: 2 Too variable to be rated. Onsite investigation needed.						
Attewan: 3	>60	>6.0	0–4 4–14 14–24 24–60	Loam Clay loam Gravelly loam, gravelly sandy loam. Very gravelly loamy sand.	CL or CL–ML CL SM or GM GP–GM or GP	A–4 or A–6 A–6 A–4, A–2 A–1
Badland: 4. Too variable to be rated.						
Bowdoin: 5	>60	>6.0	0–60	Clay	CH	A–7
Cabbart: 6 For properties of Delpoint part of 6, see Delpoint series.	10–20	>6.0	0–16 16	Loam Soft sandstone.	CL or CL–ML	A–4 or A–6
Cambert Mapped only in complex with other soils.	20–40	>6.0	0–4 4–28 28	Silt loam Silt loam, silty clay loam. Soft sandstone and siltstone.	ML ML, CL	A–4 A–4, A–6
Delpoint Mapped only in complex with other soils.	20–40	>6.0	0–32 32	Loam Soft sandstone.	CL or CL–ML	A–4 or A–6
Dilts Mapped only in complex with other soils.	10–20	>6.0	0–14 14	Clay Soft shale.	CH	A–7
Doney Mapped only in complex with other soils.	20–40	>6.0	0–23 23	Loam Soft sandstone and siltstone.	CL or CL–ML	A–4 or A–6
Dooley Mapped only in complex with other soils.	>60	>6.0	0–7 7–17 17–26 26–60	Sandy loam Sandy clay loam Sandy loam Clay or clay loam	SM SC or CL SM CL	A–2 or A–4 A–6 A–2 or A–4 A–6 or A–7
*Elloam:						
7, 9 For properties of Sunburst part of 9, see Sunburst series.	>60	>6.0	0–6 6–60	Clay loam Clay loam, clay	CL CL	A–6 A–6 or A–7
8	>60	>6.0	0–6 6–60	Gravelly clay Clay loam, clay	CL or GC CL	A–6 A–6 or A–7
*Evanston:						
10, 11, 13, 14, 15 For properties of Marmarth part of 15, see Marmarth series; for Marias part of 14, see Marias series; for Lonna part of 13, see Lonna series.	>60	>6.0	0–5 5–17 17–60	Loam Clay loam Loam or clay loam	CL or CL–ML CL CL or CL–ML	A–4 or A–6 A–6 A–4 or A–6
12	40–60	>6.0	0–5 5–17 17–50 50	Loam Clay loam Loam or clay loam Sandstone.	CL or CL–ML CL CL or CL–ML	A–4 or A–6 A–6 A–4 or A–6

properties of soils

soils in such map units may have different properties and limitations and for this reason it is necessary to follow carefully the this table. The symbol > means greater than; the symbol < means less than]

Percentage greater than 3 inches	Percentage passing sieve— No. 4	No. 10	No. 40	No. 200	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Frost action potential
					Inches per hour	*Inches per inch of soil*	*pH*	*mmhos/cm*		
0	95–100	90–100	75–95	65–75	0.06–0.2	0.12–0.18	7.9–8.4	<2–8	Moderate	Low.
0	95–100	90–100	90–100	75–95	<0.06	0.08–0.12	7.9–8.4	8–16	High	Low.
0	95–100	90–100	85–100	65–75	<0.06	0.06–0.10	7.9–9.0	>16	High	Low.
0–5	90–100	85–100	85–95	60–75	0.6–2.0	0.14–0.20	6.6–7.8	<2	Low	Moderate.
0–5	95–100	90–100	90–100	60–80	0.6–2.0	0.12–0.18	6.6–7.8	<2	Moderate	Moderate.
0–15	70–80	60–70	40–65	25–50	0.6–2.0	0.10–0.14	7.9–8.4	<2	Low	Moderate.
0–15	40–50	15–35	10–25	0–10	>6.0	<0.04	7.9–8.4	<2	Low	Low.
0	100	100	95–100	90–95	<0.06	0.10–0.14	7.9–8.4	4–10	High	Low.
0	100	100	85–95	60–75	0.6–2.0	0.14–0.20	7.9–8.4	<4	Low	Moderate.
0	100	95–100	85–95	65–75	0.6–2.0	0.14–0.20	7.9–8.4	<4	Low	Moderate.
0	100	95–100	95–100	75–95	0.6–2.0	0.16–0.22	7.9–8.4	<4	Low	Moderate.
0	100	100	85–95	60–75	0.6–2.0	0.14–0.20	7.4–8.4	<4	Low	Moderate.
0	100	95–100	90–100	90–100	0.06–0.2	0.10–0.14	4.5–5.5	<2	High	Low.
0	95–100	90–100	75–95	55–80	0.6–2.0	0.14–0.20	7.4–8.4	<4	Low	Moderate.
0	100	100	65–75	30–50	2.0–6.0	0.10–0.16	6.6–8.4	<2	Low	Moderate.
0	100	100	80–90	40–55	0.6–2.0	0.12–0.18	6.6–8.4	<2	Moderate	Moderate.
0	100	100	65–75	30–50	2.0–6.0	0.10–0.16	6.6–8.4	<4	Low	Moderate.
0	100	100	90–100	70–90	0.06–0.2	0.12–0.18	6.6–8.4	4–8	Moderate	Moderate.
0	95–100	90–100	75–95	70–80	0.06–0.2	0.12–0.18	7.4–8.4	2–6	Moderate	Low.
0	95–100	90–100	80–100	75–95	0.06–0.2	0.10–0.14	7.9–9.0	4–8	High	Low.
0	60–85	50–75	45–70	35–60	0.06–0.2	0.11–0.14	7.4–8.4	2–8	Moderate	Low.
0	95–100	90–100	80–100	75–95	0.06–0.2	0.08–0.12	7.9–9.0	8–16	High	Low.
0	100	100	85–95	60–75	0.6–2.0	0.14–0.20	7.4–7.8	<2	Low	Moderate.
0	100	100	90–100	70–80	0.6–2.0	0.12–0.18	7.4–7.8	<2	Moderate	Moderate.
0	100	100	85–95	60–75	0.6–2.0	0.12–0.20	7.9–8.4	2–8	Moderate	Moderate.
0	100	100	85–95	60–75	0.6–2.0	0.14–0.20	7.4–7.8	<2	Low	Moderate.
0	100	100	90–100	70–80	0.6–2.0	0.12–0.18	7.4–7.8	<2	Moderate	Moderate.
0	100	100	85–95	60–75	0.6–2.0	0.12–0.20	7.9–8.4	2–8	Moderate	Moderate.

TABLE 4.—*Physical and chemical*

Soil series and map symbols	Depth to— Bedrock	Depth to— Seasonal water table	Depth from surface	USDA texture	Classification Unified	Classification AASHTO
	Inches	*Feet*	*Inches*			
*Farnuf:						
16, 17, 19, 20 ---------------------. For properties of Reeder part of 19, see Reeder series; for Tinsley part of 20, see Tinsley series.	>60 (40–60 in 19)	>6.0	0–7 7–23 23–60	Loam --------------- Clay loam ----------- Loam or clay loam ----	CL or CL–ML CL CL or CL-ML	A–4 or A–6 A–6 A–4 or A–6
18 -----------------------------	>60	>6.0	0–7 7–36 36–60	Loam --------------- Clay loam or loam ----- Very gravelly loam or very gravelly sandy loam.	CL or CL-ML CL GM or GM–GC	A–4 or A–6 A–6 A–1 or A–2
Farnuf, wet --------------------. Mapped only in an undifferentiated unit with Turner, wet.	>60	3.0–5.0	0–7 7–23 23–60	Loam --------------- Clay loam ----------- Loam or clay loam ----	CL or CL–ML CL CL or CL–ML	A–4 or A–6 A–6 A–4 or A–6
Fluvaquentic Haploborolls: 21. Too variable to be rated. Onsite investigation needed.						
Glendive ------------------------. Mapped only in complex with other soils.	>60	>6.0	0–8 8–60	Loam --------------- Stratified fine sandy loam, loam, and loamy fine sand.	CL or CL–ML SM	A–4 or A–6 A–4
Harlem:						
22 ------------------------------	>60	>6.0	0–6 6–60	Silty clay loam -------- Silty clay loam and silty clay.	CL CL or CH	A–6 A–7
23 ------------------------------	>60	>6.0	0–6 6–60	Clay ---------------- Silty clay loam and silty clay.	CL or CH CL or CH	A–7 A–7
24 ------------------------------	>60	4.0–6.0	0–6 6–60	Clay ---------------- Silty clay loam and silty clay.	CL or CH CL or CH	A–7 A–7
*Havre:						
25, 26, 28 ---------------------. For properties of Glendive part of 26, see Glendive series; for Rivra part of 28, see Rivra series.	>60	>6.0	0–8 8–45 45–65	Silty clay loam, clay loam. Loam --------------- Stratified sandy loam, loam, silty clay loam, and clay.	CL or CL–ML CL or CL–ML or ML ML or CL or CL–ML	A–6 A–4 or A–6 A–4 or A–6
27 -----------------------------. For properties of Harlem part of 27, see Harlem series.	>60	>6.0	0–12 12–45 45–65	Silty clay ----------- Loam --------------- Stratified sandy loam, loam, silty clay loam, and clay.	CL CL or CL–ML ML or CL or CL–ML	A–7 A–4 or A–6 A–4 or A–6
*Hillon: 29, 30 -----------------. For properties of Telstad part of 30, see Telstad series.	>60	>6.0	0–4 4–60	Loam --------------- Loam or clay loam ----	CL or CL–ML CL or CL–ML	A–4 or A–6 A–4 or A–6
*Judith: 31 --------------------. For properties of Martinsdale part of 31, see Martinsdale series.	>60	>6.0	0–6 6–36 36–60	Loam --------------- Clay loam ----------- Loam ---------------	ML or CL–ML CL ML or CL–ML	A–4 A–4, A–6 A–4
Lallie: 32 -----------------------	>60	0–1.0	0–6 6–60	Silty clay ------------ Silty clay or clay ------	CL CL or CH	A–6 A–6 or A–7
Lihen: 33 -----------------------	>60	>6.0	0–12 12–60	Loamy fine sand ------ Loamy fine sand ------	SM, ML SM, ML	A–2, A–4 A–2, A–4

properties of soils—Continued

Percentage greater than 3 inches	Percentage passing sieve— No. 4	No. 10	No. 40	No. 200	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Frost action potential
					Inches per hour	*Inches per inch of soil*	*pH*	*mmhos/cm*		
0–5	70–100	65–100	60–95	55–75	0.6–2.0	0.14–0.20	6.1–7.3	<2	Low	Moderate.
0–5	70–100	65–100	60–100	55–80	0.6–2.0	0.12–0.18	6.6–8.4	<2	Moderate	Moderate.
0–5	70–100	65–100	60–90	50–75	0.6–2.0	0.12–0.18	7.9–8.4	0–4	Moderate	Moderate.
0–5	70–100	65–100	60–95	55–75	0.6–2.0	0.14–0.20	6.1–7.3	<2	Low	Moderate.
0–5	70–100	65–100	60–100	55–80	0.6–2.0	0.12–0.20	6.6–8.4	<2	Moderate	Moderate.
0–5	40–60	25–50	15–45	10–35	0.6–2.0	0.05–0.08	7.9–8.4	<2	Low	Moderate.
0–5	70–100	65–100	60–95	55–70	0.6–2.0	0.14–0.20	6.1–7.3	<2	Low	Moderate.
0–5	70–100	65–100	60–100	55–80	0.6–2.0	0.12–0.18	6.6–8.4	4–8	Moderate	Moderate.
0–5	70–100	65–100	60–90	50–75	0.6–2.0	0.12–0.18	7.9–8.4	4–8	Moderate	Moderate.
0	100	100	85–95	60–75	0.6–2.0	0.12–0.20	7.4–8.4	<2	Low	Moderate.
0	100	100	65–85	35–55	2.0–6.0	0.10–0.13	7.9–8.4	<2	Low	Moderate.
0	100	100	95–100	80–95	0.2–0.6	0.14–0.20	7.4–8.4	<2	Moderate	Low.
0	100	100	90–100	75–95	0.06–0.2	0.12–0.18	7.4–8.4	2–8	High	Low.
0	100	100	95–100	90–95	0.06–0.2	0.12–0.18	7.4–8.4	<2	High	Low.
0	100	100	90–100	75–95	0.06–0.2	0.12–0.18	7.4–8.4	2–8	High	Low.
0	100	100	95–100	90–95	0.06–0.2	0.12–0.18	7.4–8.4	4–15	High	Moderate.
0	100	100	90–100	75–95	0.06–0.2	0.12–0.18	7.4–8.4	4–15	High	Moderate.
0	100	100	95–100	85–95	0.2–0.6	0.14–0.20	7.4–8.4	<2	Moderate	Moderate.
0	100	100	80–95	55–75	0.6–2.0	0.14–0.20	7.9–8.4	2–8	Low	Moderate.
0	100	95–100	75–90	50–85	0.6–2.0	0.10–0.20	7.9–8.4	4–16	Low	Moderate.
0	100	100	95–100	90–95	0.06–0.2	0.12–0.18	7.4–8.4	<2	High	Moderate.
0	100	100	80–95	55–75	0.6–2.0	0.14–0.20	7.9–8.4	2–8	Low	Moderate.
0	100	100	75–90	50–85	0.6–2.0	0.10–0.20	7.9–8.4	4–16	Low	Moderate.
0–10	95–100	85–100	85–95	60–75	0.6–2.0	0.14–0.20	7.9–8.4	<2	Low	Moderate.
0–10	95–100	85–100	85–95	60–80	0.2–0.6	0.12–0.18	7.9–8.4	2–8	Moderate	Moderate.
0	80–100	70–100	65–95	50–75	0.6–2.0	0.16–0.20	7.9–8.4	<2	Low	Moderate.
0	80–100	70–95	65–95	45–75	0.6–2.0	0.12–0.18	7.9–8.4	2–4	Moderate	Moderate.
0	80–100	70–100	65–95	50–75	0.6–2.0	0.14–0.20	7.9–9.0	4–8	Low	Moderate.
0	100	100	95–100	90–95	0.06–0.2	0.12–0.18	7.9–8.4	1–8	High	High.
0	100	100	90–100	75–95	0.06–0.2	0.12–0.18	7.9–8.4	1–8	High	High.
0	100	100	55–85	20–65	6.0–20	0.06–0.11	7.4–7.8	<2	Low	Low.
0	100	100	55–85	20–65	6.0–20	0.06–0.11	7.9–8.4	<2	Low	Low.

TABLE 4.—*Physical and chemical*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal water table			Unified	AASHTO
	Inches	*Feet*	*Inches*			
*Lisam: 34, 35. For properties of Dilts part of 34 and 35, see Dilts series; Rock outcrop part of 35 too variable to be rated.	10–20	>6.0	0–12 12	Clay Soft shale.	CL or CH	A–7
Lonna: 36, 37. For properties of Marias part of 37, see Marias series.	>60	>6.0	0–11 11–65	Silt loam Silty clay loam	CL or CL–ML CL or CL–ML	A–4 or A–6 A–4 or A–6
Marias: 38	>60	>6.0	0–6 6–27 27–74	Clay Clay or silty clay Clay or silty clay	CL or CH CL or CH CL or CH	A–7 A–6 or A–7 A–6 or A–7
*Marmarth: 39. For properties of Cabbart part of 39, see Cabbart series.	20–40	>6.0	0–3 3–16 16–35 35	Loam Clay loam Clay loam Soft sandstone.	CL or CL–ML CL or CL–ML CL or CL–ML	A–4 or A–6 A–4 or A–6 A–4 or A–6
*Martinsdale: 40, 41. For properties of Judith part of 41, see Judith series.	>60	>6.0	0–5 5–24 24–60	Loam Clay loam Loam or clay loam	CL or CL–ML CL CL or CL–ML	A–4 or A–6 A–6 A–4 or A–6
Nishon: 42	>60	0.5–3.0	0–5 5–21 21–60	Loam Clay Clay	CL or CL–ML CL or CH CL	A–4 or A–6 A–6 or A–7 A–6 or A–7
*Nobe: 43, 44. For properties of Absher part of 44, see Absher series.	>60	>6.0	0–4 4–60	Clay Clay, clay loam, or silty clay loam.	CL CL	A–6 or A–7 A–6 or A–7
Parshall: 45	>60	>6.0	0–60	Sandy loam	SM	A–2 or A–4
*Phillips: 46, 47, 48, 49, 50, 51. For properties of Elloam part of 47, see Elloam series; for Nobe part of 48, see Nobe series; for the Absher part of 48, see Absher series; for Scobey part of 49, see Scobey series; for Telstad part of 50, see Telstad series; for Thoeny part of 51, see Thoeny series.	>60	>6.0	0–5 5–12 12–60	Loam Clay or clay loam Clay loam	CL or CL–ML CL CL	A–4 or A–6 A–6 or A–7 A–6
Redvale: 52	>60	>6.0	0–6 6–20 20–30 30–60	Loam Clay loam or clay Gravelly clay loam Very gravelly loamy sand or very gravelly sand.	CL or CL–ML CL SC or SC–SM GP or GP-GM	A–4 or A–6 A–6 or A–7 A–4 or A–6 A–1
*Reeder: 53, 54. For properties of Doney part of 53 and 54, see Doney series; for Cambert part of 53 and 54, see Cambert series.	20–40	>6.0	0–3 3–12 12–26 26	Loam Clay loam or loam Loam, clay loam, or sandy loam. Soft sandstone.	CL or CL–ML CL or CL–ML SM, ML or CL	A–4 or A–6 A–6 A–4 or A–6
Rivra. Mapped only in complex with other soils.	>60	>6.0	0–5 5–12 12–60	Clay loam Gravelly loam Very gravelly loamy sand or very gravelly sand.	CL or CL–ML SM or ML GP or GP–GM	A–4 or A–6 A–4 A–1
Rock outcrop: 55. Too variable to be rated. Onsite investigation needed.						

properties of soils—Continued

Percentage greater than 3 inches	Percentage passing sieve— No. 4	No. 10	No. 40	No. 200	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Frost action potential
					Inches per hour	*Inches per inch of soil*	*pH*	*mmhos/cm*		
0	100	100	90–100	90–95	0.06–0.2	0.12–0.18	6.6–8.4	1–15	High	Low.
0	100	95–100	85–100	75–90	0.6–2.0	0.18–0.22	7.9–8.4	<2	Low	Moderate.
0	100	95–100	90–100	85–95	0.6–2.0	0.16–0.22	7.9–8.4	2–4	Moderate	Moderate.
0	100	100	95–100	90–95	0.06–0.2	0.12–0.18	7.4–8.4	2–4	High	Low.
0	100	100	95–100	90–95	>0.06	0.12–0.18	7.9–8.4	2–4	High	Low.
0	100	100	95–100	90–95	>0.06	0.12–0.18	7.9–8.4	2–8	High	Low.
0	100	100	85–95	60–75	0.6–2.0	0.14–0.20	6.6–7.3	<2	Low	Moderate.
0	100	100	85–100	70–80	0.6–2.0	0.12–0.18	6.6–7.8	<2	Moderate	Moderate.
0	100	100	70–95	60–75	0.6–2.0	0.12–0.18	7.4–8.4	1–8	Low	Moderate.
0–5	95–100	85–100	85–95	50–75	0.6–2.0	0.14–0.20	6.6–8.4	<2	Low	Moderate.
0–5	95–100	85–100	90–100	60–80	0.6–2.0	0.12–0.18	7.4–8.4	<2	Moderate	Moderate.
0–10	85–100	80–100	70–95	50–75	0.6–2.0	0.10–0.16	7.9–9.0	2–8	Low	Moderate.
0	100	100	85–95	60–75	0.6–2.0	0.14–0.20	5.6–6.5	<2	Low	High.
0	100	100	80–95	80–95	<0.06	0.12–0.18	6.6–8.4	<2	High	High.
0	100	100	75–95	75–90	<0.06	0.12–0.18	7.9–9.0	2–8	High	High.
0	100	100	90–100	75–95	<0.06	0.04–0.08	7.9–9.0	4–8	High	Low.
0	100	100	90–100	70–95	<0.06	0.04–0.08	7.9–9.0	8–>16	High	Low.
0	100	100	70–85	30–50	2.0–6.0	0.10–0.13	7.4–8.4	<2	Low	Moderate.
0	95–100	90–100	75–95	60–75	0.6–2.0	0.14–0.20	6.1–7.8	<2	Low	Moderate.
0	95–100	90–100	80–100	75–95	0.06–0.2	0.12–0.16	6.6–8.4	<2	High	Low.
0	95–100	90–100	90–100	70–80	0.06–0.2	0.12–0.18	7.9–8.4	2–8	Moderate	Low.
0	95–100	90–100	75–95	50–75	0.6–2.0	0.12–0.20	6.6–7.8	<2	Low	Moderate.
0	95–100	90–100	90–100	70–90	0.06–0.2	0.12–0.18	6.6–7.8	<2	Moderate	Low.
0	70–80	50–60	45–55	35–50	0.06–0.2	0.09–0.13	7.4–8.4	2–8	Low	Moderate.
0–5	40–50	15–25	10–20	0–10	>6.0	<0.06	7.4–8.4	<2	Low	Low.
0	95–100	90–100	70–95	50–75	0.6–2.0	0.14–0.20	6.6–7.8	<2	Low	Moderate.
0	95–100	90–100	70–95	50–75	0.6–2.0	0.12–0.20	6.6–8.4	<2	Moderate	Moderate.
0	95–100	90–100	65–95	40–75	0.6–2.0	0.10–0.18	7.9–9.0	1–4	Low	Moderate.
0	95–100	90–100	85–95	60–75	0.6–2.0	0.12–0.18	6.6–7.8	<2	Low	Low.
0	75–85	50–70	45–65	35–55	0.6–2.0	0.10–0.16	7.4–8.4	<2	Low	Low.
0–5	40–60	15–35	10–30	0–10	>6.0	<0.06	7.9–8.4	<2	Low	Low.

TABLE 4.—*Physical and chemical*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal water table			Unified	AASHTO
	Inches	*Feet*	*Inches*			
Savage: 56	>60	>6.0	0–7	Clay loam	CL or CL–ML	A–4 or A–6
			7–16	Silty clay	CL	A–7
			16–50	Silty clay loam	CL or CL–ML	A–6
			50–60	Very gravelly loam	GM–GC or SM–SC	A–1 or A–2
*Scobey: 57, 59. For properties of Sunburst part of 59, see Sunburst series.	>60	>6.0	0–5	Clay loam	CL	A–6
			5–15	Clay or clay loam	CL	A–6 or A–7
			15–60	Clay loam	CL	A–6
58	>60	>6.0	0–5	Stony clay loam	CL	A–6
			5–15	Clay or clay loam	CL	A–6 or A–7
			15–60	Clay loam	CL	A–6
*Sunburst: 60, 61. For properties of Lisam part of 61, see Lisam series.	>60	>6.0	0–4	Clay loam	CL	A–6 or A–7
			4–60	Clay loam or clay	CL	A–6 or A–7
*Tally: 62, 63, 64. For properties of Dooley part of 63 and 64, see Dooley series.	>60	>6.0	0–8	Sandy loam	SM	A–2 or A–4
			8–20	Sandy loam	SM	A–2 or A–4
			20–60	Fine sand, loamy fine sand.	SM	A–2
Telstad: 65	>60	>6.0	0–8	Loam	CL or CL–ML	A–4 or A–6
			8–16	Clay loam	CL	A–6
			16–34	Loam	CL or CL–ML	A–4 or A–6
			34–60	Clay loam	CL	A–6
*Thebo: 66, 67, 68. For properties of Elloam part of 67, see Elloam series; for Lisam part of 68, see Lisam series.	20–40	>6.0	0–23	Clay	CH	A–7
			23	Clay shale.		
*Thoeny: 69. For properties of Phillips part of 69, see Phillips series.	>60	>6.0	0–6	Loam	CL, CL–ML	A–4 or A–6
			6–13	Clay	CL	A–6 or A–7
			13–60	Clay loam	CL	A–6 or A–7
*Tinsley: 70, 71. For properties of Reeder and Doney parts of 71, see Reeder and Doney series.	>60	>6.0	0–4	Very gravelly sandy loam.	GP–GM or SP–SM	A–1
			4–28	Very gravelly loamy sand or very gravelly sand.	GP or SM	A–1
			28–60	Very gravelly sand or very gravelly loamy sand.	GP or SM	A–1
*Turner: 72	>60	>6.0	0–5	Loam	CL or CL–ML	A–4 or A–6
			5–19	Clay loam	CL	A–6
			19–24	Very gravelly sandy loam or very gravelly loam.	GP–GM, GM	A–1
			24–60	Very gravelly loamy sand or very gravelly sand.	GP–GM	A–1
*Turner, wet: 73. For properties of Farnuf part of 73, see Farnuf series, wet.	>60	3.0–5.0	0–5	Loam	CL or CL–ML	A–4 or A–6
			5–19	Clay loam	CL	A–6
			19–24	Very gravelly sandy loam or very gravelly loam.	GP–GM, GM	A–1
			24–60	Very gravelly loamy sand or very gravelly sand.	GP–GM	A–1

properties of soils—Continued

Percentage greater than 3 inches	Percentage passing sieve— No. 4	No. 10	No. 40	No. 200	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Frost action potential
					Inches per hour	*Inches per inch of soil*	*pH*	*mmhos/cm*		
0	100	100	90–100	65–80	0.2–0.6	0.12–0.18	6.6–7.8	<2	Moderate	Moderate.
0	100	100	95–100	90–95	0.06–0.2	0.12–0.18	7.4–8.4	<2	High	Low.
0	100	100	90–100	85–95	0.06–0.2	0.12–0.18	7.9–8.4	<8	Moderate	Low.
0	50–75	25–50	20–45	15–50	0.6–2.0	0.06–0.09	7.9–8.4	<8	Low	Low.
0	95–100	85–100	80–100	65–80	0.2–0.6	0.12–0.18	7.4–7.8	<2	Moderate	Moderate.
0	95–100	85–100	85–100	70–90	0.2–0.6	0.12–0.16	7.4–8.4	<2	High	Low.
0	95–100	85–100	85–100	70–80	0.06–0.2	0.12–0.18	7.9–9.0	2–8	Moderate	Low.
25–40	80–100	75–80	70–75	55–65	0.2–0.6	0.10–0.14	7.4–7.8	<2	Moderate	Moderate.
25–40	95–100	85–100	85–100	70–90	0.2–0.6	0.10–0.14	7.4–8.4	<2	High	Low.
25–40	95–100	85–100	85–100	70–80	0.06–0.2	0.10–0.14	7.9–9.0	2–8	Moderate	Low.
0–5	85–100	75–95	75–95	70–80	0.2–0.6	0.12–0.18	7.9–8.4	<2	Moderate	Low.
0–5	85–100	75–95	75–95	70–90	0.06–0.2	0.12–0.16	7.9–8.4	2–8	Moderate	Moderate.
0	100	100	60–70	30–40	0.6–2.0	0.10–0.16	6.1–7.3	<2	Low	Moderate.
0	100	100	60–70	30–40	0.6–2.0	0.10–0.16	6.6–7.9	<2	Low	Moderate.
0	100	100	65–80	20–35	2.0–6.0	0.04–0.08	7.4–8.4	<2–4	Low	Moderate.
0–5	95–100	90–100	75–95	60–75	0.6–2.0	0.14–0.20	6.6–7.8	<2	Low	Moderate.
0–5	95–100	90–100	80–95	70–80	0.6–2.0	0.12–0.18	6.6–7.8	<2	Moderate	Moderate.
0–5	95–100	90–100	75–95	60–75	0.6–2.0	0.14–0.20	7.9–9.0	<2	Low	Moderate.
0–5	95–100	90–100	80–95	70–80	0.06–0.2	0.12–0.18	7.9–9.0	2–8	Moderate	Moderate.
0–5	100	100	95–100	90–95	0.06–0.2	0.12–0.16	7.4–8.4	2–8	High	Low.
0–5	95–100	90–100	75–95	60–80	0.6–2.0	0.14–0.20	5.6–6.0	<4	Low	Moderate.
0–5	95–100	90–100	80–100	70–90	<0.06	0.12–0.16	7.4–8.4	<4	High	Low.
0–5	95–100	90–100	90–100	70–80	<0.06	0.12–0.14	7.9–9.0	4–15	Moderate	Low.
0–5	45–65	20–25	10–20	5–10	6.0–20	0.05–0.08	6.6–7.3	<2	Low	Low.
0–5	40–60	20–25	10–20	0–5	6.0–20	<0.04	6.6–7.3	<2	Low	Low.
0–5	40–60	20–25	10–20	0–5	6.0–20	<0.04	7.4–8.4	<2	Low	Low.
0	100	100	85–95	60–75	0.6–2.0	0.14–0.20	6.6–7.8	<2	Low	Moderate.
0	95–100	90–100	80–95	60–80	0.6–2.0	0.12–0.18	6.6–7.8	<2	Moderate	Moderate.
0–10	45–55	15–30	10–25	5–20	2.0–6.0	0.04–0.08	7.9–8.4	<2	Low	Moderate.
0–10	40–50	10–25	10–20	0–10	6.0–20	<0.04	7.9–8.4	<2	Low	Low.
0	100	100	85–95	60–75	0.6–2.0	0.14–0.20	6.6–7.8	<2	Low	Moderate.
0	95–100	90–100	80–95	60–80	0.6–2.0	0.12–0.18	6.6–7.8	<2	Moderate	Moderate.
0–10	45–55	15–30	10–25	5–20	2.0–6.0	0.04–0.08	7.9–9.0	4–15	Low	Moderate.
0–10	40–50	10–25	10–20	0–10	6.0–20	<0.04	7.9–9.0	4–15	Low	Low.

TABLE 4.—*Physical and chemical*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal water table			Unified	AASHTO
	Inches	*Feet*	*Inches*			
Typic Fluvaquents: 74. Too variable to be rated. Onsite investigation needed.						
Ustic Torrifluvents: 75. Too variable to be rated. Onsite investigation needed.						
Vaeda: 76	>60	>6.0	0–10 10–60	Silty clay or clay Silty clay or clay	CL or CH CL or CH	A–7 A–7
Williams: 77	>60	>6.0	0–7 7–25 25–32 32–60	Loam Clay loam Loam Clay loam	CL, CL–ML CL CL, CL–ML CL	A–4 or A–6 A–6 A–4 or A–6 A–6

given for each soil series in the section "Descriptions of the Soils."

Depth to bedrock and gravel is the distance from the surface of the soil to the upper surface of the rock layer.

Depth to seasonal high water table is the distance from the surface to the highest level that ground water reaches in most recent years.

USDA texture in Table 4 uses the standard terms defined by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter, "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary. Soil reaction is important in evaluating the corrosivity of soils.

Salinity of the soils depends on the content of soluble salts, such as sodium chloride, sodium sulfate, and gypsum. It is estimated according to the electrical conductivity of the soil saturation extract, expressed in millimhos per centimeter at 25° C. The relative terms used to rate salinity are defined as follows: nonsaline, less than 4 millimhos per centimeter; slightly saline, 4 to 8; moderately saline, 8 to 15; strongly saline, more than 15. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. The salinity of individual irrigated fields is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of individual fields can differ greatly from the values given in Table 4. Salinity affects the stability of a soil when used as a construction material and its potential to corrode metal and concrete.

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content, that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Frost action potential indicates the potential for soil shearing and subsequent potential loss of soil strength

properties of soils—Continued

Percentage greater than 3 inches	Percentage passing sieve— No. 4	No. 10	No. 40	No. 200	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Frost action potential
					Inches per hour	*Inches per inch of soil*	*pH*	*mmhos/cm*		
0	100	100	90–100	85–95	<0.06	0.06–0.12	5.1–7.3	4–8	High	Low.
0	100	100	90–100	85–95	<0.06	0.06–0.12	6.1–8.4	4–8	High	Low.
0	95–100	85–100	75–95	50–75	0.6–2.0	0.14–0.20	6.6–7.3	<2	Low	Moderate.
0	95–100	85–100	80–95	60–80	0.6–2.0	0.12–0.18	7.4–8.4	<2	Moderate	Moderate.
0	95–100	85–100	75–95	50–75	0.6–2.0	0.14–0.20	7.4–8.4	<2	Low	Moderate.
0	95–100	85–100	80–95	60–80	0.06–0.2	0.12–0.18	7.4–8.4	2–8	Moderate	Moderate.

during thaw. It affects the suitability of soils for road construction and building sites. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table are most susceptible to frost action. Well drained, very gravelly or sandy soils are the least susceptible.

Soil interpretations for engineering uses

The soil interpretations in Table 5 are based on the engineering properties of soils shown in Table 4, on test data for soils in this survey area and in others nearby or adjoining counties, and on the experience of engineers and soil scientists with the soils of Valley County.

In Table 5, ratings are used to summarize suitability of the soils for roadfill, sand and gravel, and topsoil. It also lists features that affect use of the soils for pond reservoir areas, embankments, irrigation, terraces and diversions, and grassed waterways.

Soil ratings are indicated by *good, fair, poor,* and *unsuited. Good* means soil properties generally are favorable for the rated use, or have limitations that are minor and easily overcome. *Fair* means that some soil properties are unfavorable but can be overcome or modified by special planning and design. *Poor* means soil properties are so unfavorable and so difficult to correct or overcome as to require major soil reclamation, special designs, or intensive maintenance. *Unsuited* means the soil is not suited for the specified use.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material after it has been placed in an embankment, has been compacted, and has been adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profiles. The estimated engineering properties in Table 4 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in Table 5 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in Table 4.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered

TABLE 5.—*Engineering*

[An asterisk in the first column indicates that at least one map unit in this series is made up of two or more kinds of soil. The instructions for referring to other series that appear in the first column of this

Soil series and map symbols	Suitability as source of— Roadfill	Sand and gravel	Topsoil
*Absher: 1 For interpretations for Vaeda part of 1, see Vaeda series.	Poor: shrink-swell; low strength.	Unsuited	Poor: excess salt; too clayey; excess alkali.
Aquic Ustifluvents, saline: 2. Too variable to be rated. Onsite investigation needed.			
Attewan: 3	Fair: frost action; low strength.	Poor: excess fines	Fair: small stones; thin layer.
Badland: 4. Too variable to be rated.			
Bowdoin: 5	Poor: shrink-swell; low strength.	Unsuited	Poor: too clayey
Cabbart: 6 For interpretations for Delpoint part of 6, see Delpoint series.	Poor: thin layer	Unsuited	Poor: thin layer; area reclaim.
Cambert Mapped only with other soils.	Poor: thin layer	Unsuited	Fair: thin layer; area reclaim.
Delpoint Mapped only with other soils.	Poor: thin layer	Unsuited	Fair: slopes of 9 to 15 percent; area reclaim; thin layer. Poor: slopes of 15 to 25 percent.
Dilts Mapped only with other soils.	Poor: thin layer; shrink-swell; low strength.	Unsuited	Poor: thin layer; too clayey.
Doney Mapped only with other soils.	Poor: thin layer; slopes of 25 to 35 percent.	Unsuited	Fair: slopes 4 to 15 percent; thin layer; area reclaim. Poor: slopes of 15 to 35 percent.
Dooley Mapped only with other soils.	Poor: low strength	Unsuited	Fair: too clayey; thin layer; slopes of 8 to 15 percent.
*Elloam: 7, 8, 9 For interpretations for Sunburst part of 9, see Sunburst series.	Poor: low strength; shrink-swell.	Unsuited	Poor: excess salt; too clayey; excess alkali.
*Evanston: 10, 11, 12, 13, 14, 15 For interpretations for Marmarth part of 15, see Marmarth series; for Marias part of 14, see Marias series; for Lonna part of 13, see Lonna series.	Fair: frost action; shrink-swell; low strength.	Unsuited	Fair: too clayey; thin layer.
*Farnuf: 16, 17, 19, 20 For interpretations for Reeder part of 19 and 20, see Reeder series; for Tinsley part of 20, see Tinsley series.	Fair: frost action; shrink-swell; low strength; slopes of 8 to 15 percent.	Unsuited	Fair: too clayey; small stones; slopes of 8 to 15 percent.
18	Fair: shrink-swell; frost action.	Poor: excess fines	Fair: small stones; thin layer.

interpretations of soils

soils in such map units may have different properties and limitations, and for this reason it is necessary to follow carefully the table. Some terms that describe restrictive soil features are defined in the Glossary]

Soil features affecting use for—				
Farm ponds		Irrigation	Terraces and diversions	Grassed waterways
Reservoir areas	Embankments			
Favorable	Shrink-swell; low strength; hard to pack.	([1])	Percs slowly; slopes of 0 to 5 percent.	Percs slowly; excess alkali; excess salt.
Seepage	Seepage; piping	([1])	Not needed	Droughty.
Favorable	Shrink-swell; low strength; hard to pack.	Slow intake; percs slowly.	Not needed	Not needed.
Depth to rock; slopes of 5 to 35 percent.	Thin layer; low strength; hard to pack.	([1])	Depth to rock; rooting depth; slopes of 5 to 35 percent.	Rooting depth; slopes of 5 to 35 percent.
Slopes of 2 to 25 percent	Low strength; thin layer; piping.	([1])	Depth to rock; rooting depth; slopes of 2 to 25 percent.	Slopes of 2 to 25 percent.
Slopes of 9 to 25 percent; depth to rock.	Thin layer; low strength	([1])	Depth to rock; rooting depth; slopes of 9 to 25 percent.	Slopes of 9 to 25 percent.
Depth to rock; slopes of 5 to 35 percent.	Thin layer; shrink-swell; low strength.	([1])	Depth to rock; rooting depth; slopes of 5 to 35 percent.	Rooting depth; slopes of 5 to 35 percent.
Depth to rock; slopes of 4 to 35 percent.	Thin layer; shrink-swell; low strength.	([1])	Slopes of 4 to 35 percent; depth to rock; rooting depth.	Slopes of 4 to 35 percent.
Favorable	Low strength; shrink-swell	([1])	Wind erosion; slopes of 0 to 15 percent.	Favorable.
Favorable	Shrink-swell; low strength; hard to pack.	([1])	Percs slowly; slopes of 1 to 15 percent.	Percs slowly; excess salt; excess alkali.
Favorable	Low strength; shrink-swell	([1])	Slopes of 0 to 9 percent	Slopes of 0 to 9 percent.
Favorable	Low strength; shrink-swell; piping.	([1])	Slopes of 0 to 15 percent; erodes easily.	Slopes of 0 to 15 percent; erodes easily.
Seepage	Low strength; shrink-swell; piping.	([1])	Slopes of 0 to 5 percent	Slopes of 0 to 5 percent.

TABLE 5.—*Engineering*

Soil series and map symbols	Suitability as source of—		
	Roadfill	Sand and gravel	Topsoil
Farnuf, wet. Mapped only with Turner, wet.	Fair: frost action; wet; low strength.	Unsuited	Fair: too clayey; small stones.
Fluvaquentic Haploborolls: 21. Too variable to be rated. Onsite investigation needed.			
Glendive. Mapped only with other soils.	Fair: frost action; low strength.	Unsuited	Good
Harlem:			
22, 23	Poor: low strength; shrink-swell.	Unsuited	Poor: too clayey
24	Poor: shrink-swell; low strength.	Unsuited	Poor: too clayey
*Havre: 25, 26, 27, 28. For interpretations for Glendive part of 26, see Glendive series; for Harlem part of 27, see Harlem series; for Rivra part of 28, see Rivra series.	Fair: frost action; low strength.	Unsuited	Fair: too clayey
*Hillon: 29, 30. For interpretations for Telstad part of 30, see Telstad series.	Fair: frost action; shrink-swell; slopes of 15 to 25 percent. Poor: slopes of 25 to 35 percent.	Unsuited	Fair: too clayey; slopes of 9 to 15 percent. Poor: slopes of 25 to 35 percent.
*Judith: 31. For interpretations for Martinsdale part of 31, see Martinsdale series.	Fair: frost action; low strength.	Poor: excess fines	Poor: excess lime
Lallie: 32	Poor: shrink-swell; low strength; wet.	Unsuited	Poor: too clayey; wet
Lihen: 33	Good	Poor: excess fines	Poor: too sandy
*Lisam: 34, 35. Rock outcrop part of 35 too variable to rate; for Dilts part of 34 and 35, see Dilts series.	Poor: shrink-swell; thin layer; slopes of 25 to 35 percent.	Unsuited	Poor: too clayey; area reclaim; thin layer; slopes of 15 to 35 percent.
Lonna: 36, 37. For interpretations for Marias part of 37, see Marias series.	Fair: low strength; frost action; shrink-swell.	Unsuited	Fair: excess lime; excess salt.
Marias: 38	Poor: shrink-swell; low strength.	Unsuited	Poor: too clayey
*Marmarth: 39. For interpretations for Cabbart part of 39, see Cabbart series.	Fair: shrink-swell; frost action; thin layer; slopes of 15 to 25 percent.	Unsuited	Fair: thin layer; slopes of 8 to 15 percent. Poor: slopes of 15 to 25 percent.
*Martinsdale: 40, 41. For interpretations for Judith part of 41, see Judith series.	Fair: frost action; shrink-swell.	Unsuited	Fair: thin layer; excess lime; small stones; slopes of 8 to 15 percent.
Nishon: 42	Poor: shrink-swell; low strength; wet.	Unsuited	Poor: too clayey; wet

interpretations of soils—Continued

Soil features affecting use for—					
Farm ponds		Irrigation	Terraces and diversions	Grassed waterways
Reservoir areas	Embankments			
Favorable	Low strength; shrink-swell; piping.	Favorable	Favorable	Favorable.
Seepage	Low strength; piping	Complex slope.	Piping; complex slope	Not needed.
Favorable	Low strength; hard to pack; shrink-swell.	Slow intake; percs slowly.	Not needed	Not needed.
Favorable	Low strength; hard to pack; shrink-swell.	Slow intake; wet; percs slowly.	Not needed	Not needed.
Seepage	Low strength; piping	Favorable	Not needed	Not needed.
Favorable	Shrink-swell; low strength; piping.	(1)	Slopes of 9 to 35 percent	Slopes of 9 to 35 percent.
Favorable	Piping; low strength	(1)	Not needed	Not needed.
Favorable	Low strength; hard to pack; shrink-swell.	Slow intake; floods; wet; percs slowly.	Not needed	Not needed.
Seepage: slopes of 2 to 9 percent.	Piping; hard to pack	(1)	Droughty; fast intake; slopes of 2 to 9 percent.	Droughty; slopes of 2 to 9 percent.
Slopes of 2 to 35 percent; depth to rock.	Low strength; hard to pack; thin layer.	(1)	Slopes of 2 to 35 percent; depth to rock; rooting depth.	Rooting depth; slopes of 5 to 35 percent.
Slopes of 1 to 9 percent	Low strength; hard to pack; piping.	(1)	Piping; erodes easily; slopes of 1 to 9 percent.	Slopes of 1 to 9 percent; erodes easily.
Slopes of 1 to 9 percent	Low strength; hard to pack; shrink-swell.	(1)	Percs slowly; slopes of 1 to 9 percent.	Percs slowly; slopes of 1 to 9 percent.
Depth to rock; slopes of 3 to 35 percent.	Thin layer; low strength; piping.	(1)	Depth to rock; slopes of 3 to 25 percent.	Slopes of 3 to 25 percent.
Slopes of 1 to 15 percent	Low strength	(1)	Percs slowly; slopes of 3 to 25 percent.	Percs slowly; slopes of 3 to 35 percent.
Favorable	Hard to pack; low strength; shrink-swell.	(1)	Not needed	Not needed.

TABLE 5.—*Engineering*

Soil series and map symbols	Suitability as source of—		
	Roadfill	Sand and gravel	Topsoil
*Nobe: 43, 44. For interpretations for Absher part of 44, see Absher series.	Poor: shrink-swell; low strength.	Unsuited	Poor: too clayey; excess salts; excess alkali.
Parshall: 45	Fair: frost action	Unsuited	Good
*Phillips: 46, 47, 48, 49, 50, 51. For interpretations for Elloam part of 47, see Elloam series; for Nobe part of 48, see Nobe series; for Absher part of 48, see Absher series; for Scobey part of 49, see Scobey series; for Telstad part of 50, see Telstad series; for Thoeny part of 51, see Thoeny series.	Poor: low strength	Unsuited	Poor: thin layer; too clayey.
Redvale: 52	Fair: shrink-swell; frost action.	Fair for gravel: excess fines. Poor for sand: excess fines; small stones.	Poor: thin layer; too clayey; small stones.
*Reeder: 53, 54. For interpretations for Doney part of 53 and 54, see Doney series; for Cambert part of 53 and 54, see Cambert series.	Fair: frost action; low strength; shrink-swell.	Unsuited	Fair: too clayey; thin layer; area reclaim; slopes of 8 to 15 percent.
Rivra. Mapped only with Havre soils.	Good	Good	Poor: small stones
Rock outcrop: 55. Too variable to rate. Onsite investigation needed.			
Savage: 56	Poor: low strength	Unsuited	Fair: too clayey
*Scobey:			
57, 59. For interpretations for Sunburst part of 59, see Sunburst series.	Poor: low strength	Unsuited	Fair: too clayey; slopes of 8 to 15 percent.
58	Poor: low strength	Unsuited	Poor: large stones
*Sunburst: 60, 61. For interpretations for Lisam part of 61, see Lisam series.	Poor: low strength; slopes of 25 to 35 percent.	Unsuited [3]	Poor: too clayey; slopes of 15 to 35 percent.
*Tally: 62, 63, 64. For interpretations for Dooley parts of 63 and 64, see Dooley series.	Fair: frost action	Poor: excess fines	Good. Fair: slopes of 8 to 15 percent.
Telstad: 65	Fair: frost action; shrink-swell; low strength.	Unsuited	Fair: too clayey; slopes of 8 to 15 percent.
*Thebo: 66, 67, 68. For interpretations for Elloam part of 67, see Elloam series; for Lisam part of 68, see Lisam series.	Poor: shrink-swell; low strength.	Unsuited	Poor: too clayey
*Thoeny: 69. For interpretations for Phillips part of 69, see Phillips series.	Poor: low strength	Unsuited	Poor: too clayey; excess alkali.

interpretations of soils—Continued

Soil features affecting use for—				
Farm ponds		Irrigation	Terraces and diversions	Grassed waterways
Reservoir areas	Embankments			
Slopes of 0 to 5 percent	Low strength; hard to pack; shrink-swell.	(1)	Not needed	Not needed.
Seepage; slopes of 1 to 5 percent.	Piping	(1)	Wind erosion; piping; slopes of 1 to 5 percent.	Slopes of 1 to 5 percent.
Slopes of 0 to 9 percent	Low strength	(1)	Percs slowly; slopes of 0 to 9 percent.	Percs slowly; slopes of 0 to 9 percent.
Seepage; slopes of 0 to 3 percent.	Seepage	(1)	Slopes of 0 to 3 percent	Slopes of 0 to 3 percent.
Depth to rock; seepage; slopes of 2 to 15 percent.	Low strength; thin layer	(1)	Depth to rock; slopes of 2 to 15 percent.	Slopes of 2 to 15 percent.
Seepage	Seepage; piping	(1)	Not needed	Not needed.
Favorable	Low strength; hard to pack.	(1)	Percs slowly	Percs slowly.
Favorable	Low strength; hard to pack.	(1)	Complex slopes of 1 to 15 percent; percs slowly.	Slopes of 1 to 15 percent; percs slowly.
Slopes of 2 to 15 percent	Low strength; large stones; hard to pack.	(1)	Large stones; slopes of 2 to 15 percent; percs slowly.	Slopes of 2 to 15 percent; large stones; percs slowly.
Slopes of 5 to 35 percent	Low strength; hard to pack.	(1)	Slopes of 5 to 35 percent; percs slowly.	Slopes of 5 to 35 percent; percs slowly.
Seepage; slopes of 0 to 15 percent.	Piping	(1)	Complex slope of 0 to 15 percent; wind erosion.	Slopes of 0 to 15 percent.
Slopes of 1 to 15 percent	Low strength; hard to pack.	(1)	Complex slope of 1 to 15 percent; percs slowly.	Slopes of 1 to 15 percent; percs slowly.
Depth to rock; slopes of 2 to 15 percent.	Shrink-swell; low strength; thin layer.	(1)	Depth to rock; slopes of 2 to 15 percent; percs slowly.	Slopes of 2 to 15 percent; percs slowly.
Slopes of 0 to 5 percent	Low strength	(1)	Slopes of 0 to 5 percent; percs slowly.	Slopes of 0 to 5 percent; excess alkali; percs slowly.

TABLE 5.—*Engineering*

Soil series and map symbols	Suitability as source of—		
	Roadfill	Sand and gravel	Topsoil
*Tinsley: 70, 71 For interpretations for Reeder part of 71, see Reeder series; for Doney part of 71, see Doney series.	Good Fair: slopes of 15 to 25 percent. Poor: slopes of 25 to 35 percent.	Fair: excess fines	Poor: small stones; too sandy; slopes of 15 to 35 percent.
*Turner:			
72	Good below 20 to 40 inches.	Good for gravel below 20 to 40 inches. Fair for sand: excess fines; small stones.	Fair: too clayey; small stones.
73 For interpretations for Farnuf part of 73, see Farnuf series, wet.	Fair: wet	Good for gravel below 20 to 40 inches. Fair for sand: excess fines; small stones.	Fair: small stones; too clayey.
Typic Fluvaquents: 74. Too variable to be rated. Onsite investigation needed.			
Ustic Torrifluvents: 75. Too variable to be rated. Onsite investigation needed.			
Vaeda: 76	Poor: shrink-swell; low strength.	Unsuited	Poor: excess alkali; too clayey.
Williams: 77	Fair: frost action; shrink-swell; low strength.	Unsuited	Fair: too clayey

[1] Not irrigated.
[2] Small inclusions of other soils are a source of sand and gravel in some places.

is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slopes, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water and wind erosion, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, wind erosion, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Interpretations of soils for town and country planning

The soil interpretations for town and country planning in Table 6 are based on the engineering properties of soils shown in Table 4, on test data for soils in this survey area and in other nearby or adjoining counties, and on the experience of engineers and soil scientists

interpretations of soils—Continued

Soil features affecting use for—				
Farm ponds		Irrigation	Terraces and diversions	Grassed waterways
Reservoir areas	Embankments			
Seepage; slopes of 9 to 35 percent.	Seepage	(1)	Too sandy; wind erosion; slopes of 9 to 35 percent.	Droughty; slopes of 9 to 35 percent.
Seepage	Seepage	(1)	Not needed	Favorable.
Seepage	Seepage	(1)	Not needed	Not needed.
Favorable	Low strength; hard to pack.	(1)	Percs slowly	Percs slowly; excess alkali.
Favorable	Low strength	(1)	Complex slopes of 2 to 9 percent; percs slowly.	Slopes of 2 to 9 percent.

with the soils of Valley County. In Table 6, ratings are used to summarize the degree and kind of limitation of the soils for septic tank absorption fields, sewage lagoons, shallow excavations, dwellings, sanitary landfill, local roads and streets, playgrounds, picnic areas, camp areas, and paths and trails.

If the degree of soil limitation is expressed as *slight,* soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate,* soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe,* soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Following are explanations of the columns in Table 6.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 2 and 6 feet are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes, or embankments, of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or

TABLE 6.—*Soil limitations for*

[An asterisk in the first column indicates that at least one map unit in this series is made up of two or more kinds of soil. The instructions for referring to other series that appear in the first column of this

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings—	
				With basements	Without basements
*Absher: 1 For interpretations for Vaeda part of 1, see Vaeda series.	Severe: percs slowly.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 5 percent.	Moderate: too clayey.	Severe: low strength; shrink-swell.	Severe: low strength; shrink-swell.
Aquic Ustifluvents, saline: 2. Too variable to be rated. Onsite investigation needed.					
Attewan: 3	Slight[1]	Severe: seepage	Severe: cutbanks cave; small stones.	Slight	Slight
Badland: 4. Too variable to be rated. Onsite investigation needed.					
Bowdoin: 5	Severe: percs slowly.	Slight	Severe: too clayey.	Severe: shrink-swell; low strength; floods.	Severe: shrink-swell; low strength; floods.
Cabbart: 6 For interpretations for Delpoint part of 6, see Delpoint series.	Severe: depth to rock; slopes of 15 to 35 percent.	Severe: depth to rock; slopes of 7 to 35 percent.	Moderate: slopes of 5 to 15 percent; depth to rock. Severe: slopes of 15 to 35 percent.	Moderate: slopes of 5 to 15 percent; depth to rock. Severe: slopes of 15 to 35 percent.	Moderate: slopes of 5 to 15 percent; depth to rock. Severe: slopes of 15 to 35 percent.
Cambert Mapped only in complex with other soils.	Severe: depth to rock; slopes of 15 to 25 percent.	Severe: depth to rock; slopes of 7 to 25 percent.	Moderate: depth to rock; slopes of 8 to 15 percent. Severe: slopes of 15 to 25 percent.	Moderate: slopes of 5 to 15 percent; depth to rock. Severe: slopes of 15 to 25 percent.	Moderate: slopes of 5 to 15 percent; depth to rock. Severe: slopes of 15 to 25 percent.
Delpoint Mapped only in complex with other soils.	Severe: depth to rock; slopes of 15 to 25 percent.	Severe: depth to rock; slopes of 7 to 25 percent.	Moderate: depth to rock; slopes of 9 to 15 percent. Severe: slopes of 15 to 25 percent.	Moderate: depth to rock; slopes of 8 to 15 percent. Severe: slopes of 15 to 25 percent.	Moderate: depth to rock; slopes of 8 to 15 percent. Severe: slopes of 15 to 25 percent.
Dilts Mapped only in complex with other soils.	Severe: depth to rock; percs slowly; slopes of 15 to 35 percent.	Severe: depth to rock; slopes of 7 to 35 percent.	Severe: too clayey; slopes of 15 to 35 percent.	Severe: low strength; shrink-swell; slopes of 15 to 35 percent.	Severe: low strength; shrink-swell; slopes of 15 to 35 percent.
Doney Mapped only in complex with other soils.	Severe: depth to rock; slopes of 15 to 35 percent.	Severe: depth to rock; slopes of 7 to 35 percent.	Moderate: depth to rock; slopes of 9 to 15 percent. Severe: slopes of 15 to 35 percent.	Moderate: depth to rock; slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Moderate: slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.
Dooley Mapped only in complex with other soils.	Severe: percs slowly.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 7 percent. Severe: slopes of 7 to 15 percent.	Moderate: too clayey; slopes of 8 to 15 percent.	Moderate: low strength; slopes of 8 to 15 percent.	Moderate: low strength; slopes of 8 to 15 percent.

town and country planning

soils in such map units may have different properties and limitations, and for this reason it is necessary to follow carefully the table. Some terms that describe restrictive soil features are defined in the Glossary]

Sanitary landfill	Local roads and streets	Playgrounds	Picnic areas	Camp areas	Paths and trails
Moderate: too clayey.	Severe: low strength; shrink-swell.	Severe: percs slowly.	Moderate: too clayey.	Severe: percs slowly.	Moderate: too clayey.
Severe: seepage	Moderate: frost action.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 6 percent.	Slight	Slight	Slight.
Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: too clayey; percs slowly.	Severe: too clayey.	Severe: too clayey; percs slowly.	Severe: too clayey.
Severe: depth to rock; slopes of 25 to 35 percent.	Moderate: depth to rock; slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Severe: slopes of 5 to 35 percent.	Slight: slopes of 5 to 8 percent. Moderate: slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Slight: slopes of 5 to 8 percent. Moderate: slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Slight: slopes of 5 to 15 percent. Moderate: slopes of 15 to 25 percent. Severe: slopes of 25 to 35 percent.
Severe: depth to rock.	Moderate: depth to rock; slopes of 8 to 15 percent. Severe: slopes of 15 to 25 percent.	Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 25 percent.	Slight: slopes of 2 to 8 percent. Moderate: slopes of 8 to 15 percent. Severe: slopes of 15 to 25 percent.	Slight: slopes of 2 to 8 percent. Moderate: slopes of 8 to 15 percent. Severe: slopes of 15 to 25 percent.	Slight: slopes of 2 to 15 percent. Moderate: slopes of 15 to 25 percent.
Severe: depth to rock.	Moderate: frost action; slopes of 9 to 15 percent. Severe: slopes of 15 to 25 percent.	Severe: slopes of 9 to 25 percent.	Moderate: slopes of 9 to 15 percent. Severe: slopes of 15 to 25 percent.	Moderate: slopes of 9 to 15 percent. Severe: slopes of 15 to 25 percent.	Slight: slopes of 9 to 15 percent. Moderate: slopes of 15 to 25 percent.
Severe: depth to rock; too clayey; slopes of 25 to 35 percent.	Severe: low strength; shrink-swell; slopes of 15 to 35 percent.	Severe: too clayey; slopes of 6 to 35 percent.	Severe: too clayey; slopes of 15 to 35 percent.	Severe: too clayey; slopes of 15 to 25 percent.	Severe: too clayey; slopes of 25 to 35 percent.
Severe: depth to rock; slopes of 25 to 35 percent.	Moderate: frost action; slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Moderate: slopes of 4 to 6 percent. Severe: slopes of 6 to 35 percent.	Slight: slopes of 4 to 8 percent. Moderate: slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Slight: slopes of 4 to 8 percent. Moderate: slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Slight: slopes of 4 to 15 percent. Moderate: slopes of 15 to 25 percent. Severe: slopes of 25 to 35 percent.
Slight	Severe: low strength.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 15 percent.	Slight: slopes of 0 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight: slopes of 0 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight.

TABLE 6.—*Soil limitations for town*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings—	
				With basements	Without basements
*Elloam:					
7, 9 For interpretations for Sunburst part of 9, see Sunburst series.	Severe: percs slowly.	Slight: slopes of 1 to 2 percent. Moderate: slopes of 2 to 7 percent. Severe: slopes of 7 to 15 percent.	Moderate: too clayey; slopes of 8 to 15 percent.	Severe: low strength.	Severe: low strength.
8	Severe: percs slowly.	Moderate: slopes of 2 to 7 percent. Severe: slopes of 7 to 9 percent.	Moderate: too clayey.	Severe: low strength.	Severe: low strength.
*Evanston:					
10, 11, 13, 14, 15 For interpretations for Marmarth part of 15, see Marmarth series; for Marias part of 14, see Marias series; for Lonna part of 13, see Lonna series.	Moderate: percs slowly.	Moderate: seepage; slopes of 2 to 7 percent. Severe: slopes of 7 to 9 percent.	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.
12	Severe: depth to rock.	Moderate: depth to rock; slopes of 2 to 7 percent. Severe: slopes of 7 to 9 percent.	Moderate: too clayey; depth to rock.	Moderate: shrink-swell.	Moderate: shrink-swell.
*Farnuf:					
16, 17, 19, 20 For interpretations for Reeder part of 19 and 20, see Reeder series; for Tinsley part of 20, see Tinsley series.	Moderate: percs slowly.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 7 percent. Severe: slopes of 7 to 15 percent.	Moderate: too clayey; slopes of 8 to 15 percent.	Moderate: shrink-swell; low strength; slopes of 8 to 15 percent.	Moderate: shrink-swell; low strength; slopes of 8 to 15 percent.
18	Slight	Severe: seepage	Severe: cutbanks cave; small stones.	Moderate: shrink-swell; low strength.	Moderate: shrink-swell; low strength.
Farnuf, wet Mapped only in undifferentiated unit with Turner, wet.	Severe: wet	Severe: wet	Severe: wet	Severe: wet	Severe: wet
Fluvaquentic Haploborolls: 21. Too variable to be rated. Onsite investigation needed.					
Glendive Mapped only in complex with other soils.	Moderate: [1] floods.	Severe: [1] seepage; floods.	Moderate: floods	Severe: floods	Severe: floods
Harlem:					
22	Severe: percs slowly.	Severe: floods	Severe: too clayey.	Severe: shrink-swell; floods.	Severe: shrink-swell; floods.
23, 24	Severe: percs slowly.	Severe: floods	Severe: too clayey.	Severe: shrink-swell; floods.	Severe: shrink-swell; floods.

and country planning—Continued

Sanitary landfill	Local roads and streets	Playgrounds	Picnic areas	Camp areas	Paths and trails
Moderate: too clayey.	Severe: low strength.	Moderate: too clayey; slopes of 2 to 6 percent. Severe: slopes of 6 to 15 percent.	Moderate: too clayey; slopes of 8 to 15 percent.	Moderate: too clayey; slopes of 8 to 15 percent.	Moderate: too clayey.
Moderate: too clayey.	Severe: low strength.	Severe: too clayey; slopes of 6 to 9 percent.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Slight	Moderate: shrink-swell; frost action.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 9 percent.	Slight	Slight	Slight.
Severe: depth to rock.	Moderate: shrink-swell; frost action.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 9 percent.	Slight	Slight	Slight.
Moderate: too clayey.	Moderate: frost action; shrink-swell; low strength.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 15 percent.	Slight: slopes of 0 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight: slopes of 0 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight.
Severe: seepage; small stones.	Moderate: frost action; shrink-swell; low strength.	Slight	Slight	Slight	Slight.
Severe: wet	Severe: wet	Slight	Slight	Slight	Slight.
Severe:[1] seepage	Moderate: floods; frost action.	Moderate: floods	Moderate: floods	Severe: floods	Slight.
Severe: too clayey.	Severe: shrink-swell; low strength.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.

TABLE 6.—*Soil limitations for town*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings—	
				With basements	Without basements
*Havre: 25, 26, 28. For interpretations for Glendive part of 26, see Glendive series; for Rivra part of 28, see Rivra series.	Moderate: percs slowly; floods.	Severe: floods	Moderate: floods	Severe: floods	Severe: floods
27. For interpretations for Harlem part of 27, see Harlem series.	Moderate: percs slowly; floods.	Severe: floods	Moderate: floods	Severe: floods	Severe: floods
*Hillon: 29, 30. For interpretations for Telstad part of 30, see Telstad series.	Severe: percs slowly; slopes of 15 to 35 percent.	Severe: slopes of 9 to 35 percent.	Moderate: too clayey; slopes of 9 to 15 percent. Severe: slopes of 15 to 35 percent.	Moderate: slopes of 9 to 15 percent; shrink-swell; low strength. Severe: slopes of 15 to 35 percent.	Moderate: slopes of 9 to 15 percent; shrink-swell; low strength. Severe: slopes of 15 to 35 percent.
*Judith: 31. For interpretations for Martinsdale part of 31, see Martinsdale series.	Moderate: percs slowly; slopes of 8 to 15 percent.	Moderate: seepage; slopes of 2 to 7 percent. Severe: slopes of 7 to 15 percent.	Moderate: cutbanks cave; slopes of 8 to 15 percent.	Moderate: shrink-swell; slopes of 8 to 15 percent.	Moderate: shrink-swell; slopes of 8 to 15 percent.
Lallie: 32	Severe: percs slowly; floods; wet.	Severe: wet; floods.	Severe: floods; wet; too clayey.	Severe: floods; wet; shrink-swell.	Severe: floods; wet; shrink-swell.
Lihen: 33	Slight [1]	Severe: [1] seepage; slopes of 7 to 9 percent.	Severe: cutbanks cave; too sandy.	Slight	Slight
*Lisam: 34, 35. Rock outcrop part of 35 too variable to rate; for Dilts part of 34 and 35, see Dilts series.	Severe: percs slowly; depth to rock; slopes of 15 to 35 percent.	Severe: depth to rock; slopes of 7 to 35 percent.	Severe: too clayey; slopes of 15 to 35 percent.	Severe: shrink-swell; low strength; slopes of 15 to 35 percent.	Severe: shrink-swell; low strength; slopes of 15 to 35 percent.
Lonna: 36, 37. For interpretations for Marias part of 37, see Marias series.	Moderate: percs slowly.	Moderate: seepage; slopes of 2 to 7 percent. Severe: slopes of 7 to 9 percent.	Moderate: too clayey.	Moderate: shrink-swell; low strength.	Moderate: shrink-swell; low strength.
Marias: 38	Severe: percs slowly.	Slight: slopes of 1 to 2 percent. Moderate: slopes of 2 to 7 percent. Severe: slopes of 7 to 9 percent.	Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: shrink-swell; low strength.
*Marmarth: 39. For interpretations for Cabbart part of 39, see Cabbart series.	Severe: depth to rock; slopes of 15 to 25 percent.	Severe: depth to rock; slopes of 7 to 25 percent.	Moderate: depth to rock; slopes of 8 to 15 percent. Severe: slopes of 15 to 25 percent.	Moderate: shrink-swell; slopes of 8 to 15 percent; low strength. Severe: slopes of 15 to 25 percent.	Moderate: shrink-swell; slopes of 8 to 15 percent; low strength. Severe: slopes of 15 to 25 percent.

and country planning—Continued

Sanitary landfill	Local roads and streets	Playgrounds	Picnic areas	Camp areas	Paths and trails
Moderate: floods	Moderate: floods; frost action; low strength.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
Moderate: floods	Moderate: floods; frost action; low strength.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Moderate: too clayey; slopes of 15 to 25 percent. Severe: slopes of 25 to 35 percent.	Severe: low strength; slopes of 15 to 35 percent.	Severe: slopes of 9 to 35 percent.	Moderate: slopes of 9 to 15 percent. Severe: slopes of 15 to 35 percent.	Moderate: slopes of 9 to 15 percent. Severe: slopes of 15 to 35 percent.	Slight: slopes of 9 to 15 percent. Moderate: slopes of 15 to 25 percent. Severe: slopes of 25 to 35 percent.
Moderate: too clayey.	Moderate: frost action; shrink-swell; slopes of 8 to 15 percent.	Slight: slopes of 1 to 2 percent. Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 15 percent.	Slight: slopes of 1 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight; slopes of 1 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight.
Severe: floods; wet; too clayey.	Severe: wet; floods; shrink-swell; frost action.	Severe: floods; too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Severe:[1] seepage	Slight	Moderate: too sandy; slopes of 2 to 6 percent. Severe: slopes of 6 to 9 percent.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Severe: too clayey; slopes of 25 to 35 percent; depth to rock.	Severe: shrink-swell; low strength; slopes of 15 to 35 percent.	Severe: too clayey; slopes of 6 to 35 percent; depth to rock.	Severe: too clayey; slopes of 6 to 35 percent.	Severe: too clayey; slopes of 6 to 35 percent.	Severe: too clayey; slopes of 6 to 35 percent.
Moderate: too clayey.	Moderate: frost action; shrink-swell; low strength.	Slight: slopes of 1 to 2 percent. Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 9 percent.	Slight	Slight	Slight.
Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: too clayey; slopes of 6 to 9 percent.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Severe: depth to rock.	Moderate: shrink-swell; frost action; low strength; slopes of 8 to 15 percent. Severe: slopes of 15 to 25 percent.	Moderate: slopes of 3 to 6 percent. Severe: slopes of 6 to 25 percent.	Slight: slopes of 3 to 8 percent. Moderate: slopes of 8 to 15 percent. Severe: slopes of 15 to 25 percent.	Slight: slopes of 3 to 8 percent. Moderate: slopes of 8 to 15 percent. Severe: slopes of 15 to 25 percent.	Slight: slopes of 3 to 15 percent. Moderate: slopes of 15 to 25 percent.

TABLE 6.—*Soil limitations for town*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings—	
				With basements	Without basements
*Martinsdale: 40, 41 For interpretations for Judith part of 41, see Judith series.	Moderate: percs slowly.	Slight: slopes of 1 to 2 percent. Moderate: slopes of 2 to 7 percent. Severe: slopes of 7 to 15 percent.	Moderate: too clayey; slopes of 8 to 15 percent.	Moderate: shrink-swell; low strength; slopes of 8 to 15 percent.	Moderate: shrink-swell; low strength; slopes of 8 to 15 percent.
Nishon: 42	Severe: percs slowly; floods.	Slight	Severe: floods; too clayey.	Severe: floods; shrink-swell; low strength.	Severe: floods; shrink-swell; low strength.
*Nobe: 43, 44 For interpretations for Absher part of 44, see Absher series.	Severe: percs slowly.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 5 percent.	Severe: too clayey.	Severe: shrink-swell; floods; low strength.	Severe: shrink-swell; floods; low strength.
Parshall: 45	Slight[1]	Severe:[1] seepage.	Moderate: cutbanks cave.	Slight	Slight
*Phillips: 46, 47, 48, 49, 50, 51. For interpretations for Elloam part of 47, see Elloam series; for Nobe part of 48, see Nobe series; for Absher part of 48, see Absher series; for Scobey part of 49, see Scobey series; for Telstad part of 50, see Telstad series; for Thoeny part of 51, see Thoeny series.	Severe: percs slowly.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 5 percent.	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.
Redvale: 52	Slight[1]	Severe:[1] seepage.	Severe: cutbanks cave; small stones.	Moderate: shrink-swell.	Moderate: shrink-swell.
*Reeder: 53, 54 For interpretations for Doney part of 53 and 54, see Doney series; for Cambert part of 53 and 54, see Cambert series.	Severe: depth to rock; percs slowly.	Severe: depth to rock; slopes of 7 to 15 percent.	Moderate: depth to rock; slopes of 8 to 15 percent.	Moderate: depth to rock; shrink-swell; slopes of 8 to 15 percent.	Moderate: shrink-swell; slopes of 8 to 15 percent.
Rivra Mapped only with Havre soils.	Severe:[1] floods	Severe:[1] seepage.	Severe: cutbanks cave; small stones; too sandy.	Severe: floods	Severe: floods
Rock outcrop: 55. Too variable to rate. Onsite investigation needed.					
Savage: 56	Severe: percs slowly.	Slight	Moderate: too clayey.	Moderate: shrink-swell; low strength.	Moderate: shrink-swell; low strength.

and country planning—Continued

Sanitary landfill	Local roads and streets	Playgrounds	Picnic areas	Camp areas	Paths and trails
Moderate: too clayey.	Moderate: frost action; shrink-swell; low strength; slopes of 8 to 15 percent.	Slight: slopes of 1 to 2 percent. Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 15 percent.	Slight: slopes of 1 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight: slopes of 1 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight.
Severe: floods; too clayey.	Severe: floods; low strength; shrink-swell.	Severe: floods	Moderate: floods	Severe: floods	Moderate: floods.
Severe: too clayey.	Severe: shrink-swell; floods; low strength.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Severe: seepage	Moderate: frost action.	Slight: slopes of 1 to 2 percent. Moderate: slopes of 2 to 5 percent.	Slight	Slight	Slight.
Moderate: too clayey.	Severe: low strength; shrink-swell.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 9 percent.	Slight	Slight	Slight.
Severe:[1] seepage	Moderate: shrink-swell; frost action; low strength.	Slight	Slight	Slight	Slight.
Severe: depth to rock.	Moderate: shrink-swell; frost action; low strength; slopes of 8 to 15 percent.	Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 15 percent.	Slight: slopes of 2 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight: slopes of 2 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight.
Severe:[1] seepage	Moderate: floods	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
Moderate: too clayey.	Severe: low strength.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.

TABLE 6.—*Soil limitations for town*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings—	
				With basements	Without basements
*Scobey: 57, 59. For interpretations for Sunburst part of 59, see Sunburst series.	Severe: percs slowly.	Slight: slopes of 1 to 2 percent. Moderate: slopes of 2 to 7 percent. Severe: slopes of 7 to 15 percent.	Moderate: too clayey; slopes of 8 to 15 percent.	Severe: shrink-swell.	Severe: shrink-swell.
58	Severe: percs slowly.	Moderate: large stones; slopes of 2 to 7 percent. Severe: slopes of 7 to 15 percent.	Moderate: large stones; too clayey; slopes of 8 to 15 percent.	Severe: shrink-swell.	Severe: shrink-swell.
*Sunburst: 60, 61. For interpretations for Lisam part of 61, see Lisam series.	Moderate: percs slowly; slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Moderate: slopes of 5 to 7 percent. Severe: slopes of 7 to 35 percent.	Moderate: too clayey; slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Moderate: shrink-swell; low strength; slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Moderate: shrink-swell; low strength; slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.
*Tally: 62, 63, 64. For interpretations for Dooley part of 63 and 64, see Dooley series.	Slight:[1] slopes of 0 to 8 percent. Moderate: slopes of 8 to 15 percent.	Severe:[1] seepage; slopes of 7 to 15 percent.	Severe: cutbanks cave.	Slight: slopes 0 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight: slopes of 0 to 8 percent. Moderate: slopes of 8 to 15 percent.
Telstad: 65	Severe: percs slowly.	Slight: slopes of 1 to 2 percent. Moderate: slopes of 2 to 7 percent. Severe: slopes of 7 to 15 percent.	Moderate: too clayey; slopes of 8 to 15 percent.	Moderate: shrink-swell; slopes of 8 to 15 percent.	Moderate: shrink-swell; slopes of 8 to 15 percent.
*Thebo: 66, 67, 68. For interpretations for Elloam part of 67, see Elloam series; for Lisam part of 68, see Lisam series.	Severe: percs slowly; depth to rock.	Severe: depth to rock; slopes of 6 to 15 percent.	Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: shrink-swell; low strength.
*Thoeny: 69. For interpretations for Phillips part of 69, see Phillips series.	Severe: percs slowly.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 5 percent.	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.
*Tinsley: 70, 71. For interpretations for Reeder part of 71, see Reeder series; for Doney part of 71, see Doney series.	Moderate:[1] slopes of 9 to 15 percent. Severe: slopes of 15 to 35 percent.	Severe:[1] seepage; slopes of 9 to 35 percent; small stones.	Severe: cutbanks cave; slopes of 15 to 35 percent; small stones.	Moderate: slopes of 9 to 15 percent. Severe: slopes of 15 to 35 percent.	Moderate: slopes of 9 to 15 percent. Severe: slopes of 15 to 35 percent.
*Turner: 72	Slight[1]	Severe:[1] seepage.	Severe: cutbanks cave; small stones.	Moderate: shrink-swell.	Moderate: shrink-swell.
Turner, wet: 73. For interpretations for Farnuf part of 73, see Farnuf series, wet.	Severe:[1] wet	Severe:[1] seepage; wet.	Severe: wet	Severe: wet	Severe: wet

and country planning—Continued

Sanitary landfill	Local roads and streets	Playgrounds	Picnic areas	Camp areas	Paths and trails
Moderate: too clayey.	Severe: low strength.	Moderate: too clayey; slopes of 2 to 6 percent. Severe: slopes of 6 to 15 percent.	Moderate: too clayey; slopes of 8 to 15 percent.	Moderate: too clayey; slopes of 8 to 15 percent.	Moderate: too clayey.
Moderate: large stones; too clayey.	Severe: low strength.	Moderate: large stones; too clayey; slopes of 2 to 6 percent. Severe: slopes of 6 to 15 percent.	Moderate: too clayey; slopes of 8 to 15 percent.	Moderate: too clayey; large stones; slopes of 8 to 15 percent.	Moderate: too clayey; large stones.
Moderate: too clayey; slopes of 15 to 25 percent. Severe: slopes of 25 to 35 percent.	Severe: low strength; slopes of 15 to 35 percent.	Severe: slopes of 5 to 35 percent.	Moderate: too clayey; slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Moderate: too clayey; slopes of 8 to 15 percent. Severe: slopes of 15 to 35 percent.	Moderate: too clayey; slopes of 15 to 25 percent. Severe: slopes of 25 to 35 percent.
Severe: [1] seepage	Moderate: frost action; slopes of 8 to 15 percent.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 15 percent.	Slight: slopes of 0 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight: slopes of 0 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight.
Moderate: too clayey.	Moderate: shrink-swell; frost action; low strength; slopes of 8 to 15 percent.	Slight: slopes of 1 to 2 percent. Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 15 percent.	Slight: slopes of 1 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight: slopes of 1 to 8 percent. Moderate: slopes of 8 to 15 percent.	Slight.
Severe: depth to rock; too clayey.	Severe: depth to rock; low strength; shrink-swell.	Severe: too clayey; slopes of 6 to 15 percent.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Moderate: too clayey.	Severe: low strength; shrink-swell.	Moderate: too clayey; slopes of 2 to 5 percent.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
Severe: [1] seepage; small stones; slopes of 25 to 35 percent.	Moderate: slopes of 9 to 15 percent. Severe: slopes of 15 to 35 percent.	Severe: small stones; slopes of 9 to 35 percent.	Severe: small stones; slopes of 15 to 35 percent.	Severe: small stones; slopes of 15 to 35 percent.	Severe: small stones; slopes of 25 to 35 percent.
Severe: [1] seepage; small stones.	Moderate: shrink-swell; frost action.	Slight	Slight	Slight	Slight.
Severe: wet	Severe: wet	Slight	Slight	Slight	Slight.

TABLE 6.—*Soil limitations for town*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings—	
				With basements	Without basements
Typic Fluvaquents: 74. Too variable to be rated. Onsite investigation needed.					
Ustic Torrifluvents: 75. Too variable to be rated. Onsite investigation needed.					
Vaeda: 76	Severe: percs slowly.	Slight: slopes of 0 to 2 percent. Moderate: slopes of 2 to 5 percent.	Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: shrink-swell; low strength.
Williams: 77	Severe: percs slowly.	Moderate: slopes of 2 to 7 percent. Severe: slopes of 7 to 9 percent.	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.

[1] Possible contamination of ground water in some places.

boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemetery plots. Such digging or trenching is influenced by soil wetness caused by seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings with and without basements referred to in Table 6 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. They are supported by foundation footings placed in the undisturbed soil. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in Table 6 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. For some soils, reliable predictions can be made to a depth of 10 to 15 feet; however, site investigation is needed before a site is selected.

Local roads and streets, referred to in Table 6, have an all-weather surface that can carry light to medium

and country planning—Continued

Sanitary landfill	Local roads and streets	Playgrounds	Picnic areas	Camp areas	Paths and trails
Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Moderate: too clayey.	Moderate: shrink-swell; frost action; low strength.	Moderate: slopes of 2 to 6 percent. Severe: slopes of 6 to 9 percent.	Slight	Slight	Slight.

traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded to shed water and have ordinary provisions for drainage. They are built mainly from soil at hand, and most cuts and fills are less than six feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Formation and classification of the soils

In this section, the factors that affect the formation of soils are discussed, the higher categories of soil classification are defined, the soil series of the county are placed in these categories.

Factors of soil formation

Soil is composed of mineral matter mixed with varying amounts of organic matter derived mostly from vegetation. The minerals were a part of the parent material that have been weathered and broken down by the combined effect of climate, living organisms, and topography over long periods of time. Within short distances, the combination of these factors varies, and as a result the soils that form have different fertility, productivity, and physical and chemical characteristics.

Parent material

Most of the soils in Valley County formed in place in glacial till and over clay shale and sandstone. Some soils formed in alluvium derived from glacial till, shale, and sandstone. The alluvium was deposited in the major valleys and on uplands. Soils that formed in glacial till are loamy or clayey depending on the texture of the till. Because clay is the basic constituent of shale, soils that formed in shale, such as the Lisam series, are clayey. Soils that formed in weathered sandstone, such as those in the Cabbart series, are generally loamy. The clay these soils contain was an impurity in the sandstone that was released by weathering. Soils that formed in mixed alluvium derived from glacial till, sandstone, and shale, such as those in the Havre series, are loamy.

Some of the soils in the county have acquired salt and sodium from the parent material. The salts and sodium make these soils saline or alkali and limit the kinds and amount of plants that can grow on them.

Climate

Climate, an active force in the formation of soils, is determined mainly by temperature and precipitation. Erosion combined with alternate freezing and heating break rocks down into material, called parent material, in which soils form. The weathered parent material is further broken down by chemical reactions, such as solution and hydration. The precipitation and temperature affect the kind and amount of native vegetation that grows on the soil. The vegetation decays to produce organic matter in the soil. Soils in a climate of cool temperature and high precipitation are generally dark colored, and those in a climate of low precipitation and high temperatures are generally light colored. In this county precipitation ranges from 10 to 14 inches annually.

Living organisms

Living organisms also are active in the formation of soils. They provide organic matter, the main source of the dark color of the surface layer of soils. Fungi and algae are among the earliest inhabitants of rock material, and they contribute to the decomposition of rocks. As the rocks decompose and soil forms, grasses, shrubs, and trees are able to grow on the surface to support animal life.

The kinds of plants and animals largely determine the kinds and amount of organic matter added to the soils and how this matter is incorporated into the mineral part of the soil. Roots, rodents, and insects penetrate the soil and influence its structure. Leaves, roots, and whole plants remain in the surface layer where they are changed to humus by micro-organisms, chemicals in the soil, and insects.

The vegetation in Valley County is mainly short and mid grasses and shrubs. Common rodents are gophers, prairie dogs, badgers, rabbits, and mice.

Topography

Topography, or relief, is determined by glaciation and the age and resistance of geologic formations to erosion by water and wind. In the eroded uplands of the county, runoff water has carved deep valleys that have many branches into the original bedrock. The rugged relief contrasts sharply with the smooth relief of the glacial till plains and the flood plains of the river valleys.

In the uplands the number and distinctness of soil horizons decrease as slope increases. Steep soils that have rapid runoff have many characteristics similar to those of soils formed in dry climates. Nearly level to gently rolling soils have the characteristics of soils that form in the semiarid climate that is typical of Valley County. An example of this pattern is the Cabbart and Scobey soils. The shallow Cabbart soil has moderately steep slopes and has no B horizon. The nearly level to gently rolling Scobey soil is deep and has a B horizon that is 5 to 15 inches thick.

Time

The changes that take place in a soil over long periods of time are called soil genesis. These changes give the soil distinct horizons, or layers, by which it can be recognized. The kinds and arrangement of these horizons are called soil morphology and are described in terms of color, texture, structure, consistence, thickness, permeability, and chemistry.

Soils are classified as young to mature. The age of a soil is determined by the degree of horizon development, the content of organic matter and of clay, the depth to which soluble material is leached, and the form and distribution of calcium carbonate and gypsum in the soil.

Havre silty clay loam, a soil of the Entisol order, is an example of a young soil. It is on a flood plain adjacent to a flowing stream. The soil contains little organic matter with which to form an A horizon, it has no clay accumulation, and little translocation of carbonates has occurred to form B2 and Cca horizons.

The Evanston soils formed in parent material similar to that of Havre silty clay loam. Evanston soils formed in alluvium on uplands and are mature soils of the Mollisol order. They contain enough organic matter to have a moderately dark A horizon. They also have a distinct clay accumulation in a B2t horizon, and nearly all the carbonates have been leached to a depth of about 12 inches.

Classification of soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas such as countries and continents. The

system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965 (*4*). Because this system is under continual study, readers interested in developments of the current system should search the latest literature available.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the classification is based on different soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped. In table 7, the soil series of Valley County are placed in the current system. Classes of the current system are briefly defined in the following paragraphs.

ORDER: Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are the Entisols and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables ending in *sol* (Moll-i-sol).

SUBORDER: Each order is subdivided into suborders that are based primarily on those soil characteristics that produce classes that have the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of water-logging, or soil differences resulting from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is *Boroll* (*Bor* meaning cool, and *oll* from Mollisol).

GREAT GROUP: Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface hori-

TABLE 7.—*Classification of the soils*

Series	Family	Subgroup	Order
Absher	Fine, montmorillonitic	Borollic Natrargids	Aridisols.
Attewan	Fine-loamy over sandy or sandy-skeletal, mixed	Aridic Argiborolls	Mollisols.
*Bowdoin	Very fine, montmorillonitic (calcareous), frigid	Ustertic Torrifluvents	Entisols.
Cabbart	Loamy, mixed (calcareous), frigid, shallow	Ustic Torriorthents	Entisols.
Cambert	Fine-silty, mixed, frigid	Typic Ustochrepts	Inceptisols.
Delpoint	Fine-silty, mixed	Borollic Camborthids	Aridisols.
Dilts	Clayey, montmorillonitic, acid, frigid, shallow	Ustic Torriorthents	Entisols.
Doney	Fine-loamy, mixed (calcareous), frigid	Typic Ustorthents	Entisols.
Dooley	Fine-loamy, mixed	Typic Argiborolls	Mollisols.
Elloam	Fine, montmorillonitic	Borollic Natrargids	Aridisols.
Evanston	Fine-loamy, mixed	Aridic Argiborolls	Mollisols.
Farnuf	Fine-loamy, mixed	Typic Argiborolls	Mollisols.
Glendive	Coarse-loamy, mixed (calcareous), frigid	Ustic Torrifluvents	Entisols.
Harlem	Fine, montmorillonitic (calcareous), frigid	Ustic Torrifluvents	Entisols.
Havre	Fine-loamy, mixed (calcareous), frigid	Ustic Torrifluvents	Entisols.
Hillon	Fine-loamy, mixed (calcareous), frigid	Ustic Torriorthents	Entisols.
Judith	Fine-loamy, carbonatic	Typic Calciborolls	Mollisols.
Lallie	Fine, montmorillonitic (calcareous), frigid	Typic Fluvaquents	Entisols.
Lihen	Sandy, mixed	Entic Haploborolls	Mollisols.
*Lisam	Clayey, montmorillonitic (calcareous), frigid, shallow	Ustic Torriorthents	Entisols.
Lonna	Fine-silty, mixed	Borollic Camborthids	Aridisols.
Marias	Fine, montmorillonitic (calcareous), frigid	Ustertic Torriorthents	Entisols.
Marmarth	Fine-loamy, mixed	Aridic Argiborolls	Mollisols.
Martinsdale	Fine-loamy, mixed	Typic Argiborolls	Mollisols.
Nishon	Fine, montmorillonitic, frigid	Typic Albaqualfs	Alfisols.
Nobe	Fine, montmorillonitic (calcareous), frigid	Ustic Torriorthents	Entisols
Parshall	Coarse-loamy, mixed	Pachic Haploborolls	Mollisols.
Phillips	Fine, montmorillonitic	Borollic Paleargids	Aridisols.
Redvale	Clayey over sandy or sandy-skeletal, montmorillonitic	Borollic Paleargids	Aridisols.
Reeder	Fine-loamy, mixed	Typic Argiborolls	Mollisols.
Rivra	Sandy-skeletal, mixed, frigid	Ustic Torrifluvents	Entisols.
Savage	Fine, montmorillonitic	Typic Argiborolls	Mollisols.
Scobey	Fine, montmorillonitic	Aridic Argiborolls	Mollisols.
Sunburst	Fine, montmorillonitic (calcareous), frigid	Ustic Torriorthents	Entisols.
Tally	Coarse-loamy, mixed	Typic Haploborolls	Mollisols.
Telstad	Fine-loamy, mixed	Aridic Argiborolls	Mollisols.
Thebo	Very fine, montmorillonitic (calcareous), frigid	Ustertic Torriorthents	Entisols.
Thoeny	Fine, montmorillonitic	Borollic Natrargids	Aridisols.
Tinsley	Sandy-skeletal, mixed, frigid	Typic Ustorthents	Entisols.
Turner	Fine-loamy over sandy or sandy-skeletal, mixed	Typic Argiborolls	Mollisols.
Vaeda	Fine, montmorillonitic, nonacid, frigid	Ustic Torriorthents	Entisols.
Williams	Fine-loamy, mixed	Typic Argiborolls	Mollisols.

*These are taxadjuncts to the named series. Classification given is for the series. In Valley County these soils are in a nonacid, rather than a calcareous, family.

zons. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark red and dark brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Argiborolls (*Argi* meaning argillic horizon, *bor* for cool, and *oll* from Mollisols).

SUBGROUP: Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others called intergrades that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Argiborolls (a *typical* Argiboroll).

FAMILY: Soil families are separated within a subgroup primarily on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on, that are used as family differentiae. An example is the fine-loamy, mixed family of Typic Argiborolls.

SERIES: As explained in the section "How this survey was made," the series consists of a group of soils that have similar profiles. They have major horizons, except for texture of the surface layer, that are similar in important characteristics and in arrangement in the profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

General nature of the county

This section discusses the physiography and drainage; climate; natural resources; settlement, farming, and ranching; and industry, markets, and transportation of the county. Statistics for population and agriculture are from reports by the U. S. Bureau of Census and the U. S. Department of Agriculture.

Physiography and drainage

Valley County is located in the plains area of northeastern Montana. It is bordered on the north by Canada and on the south by Fort Peck Reservoir and the Missouri River. Elevation ranges from almost 3,300 feet on the plateaus in the northeastern part of the county near Opheim to about 2,000 feet in the southeastern part near Oswego, where the Missouri River leaves the county. The lowest elevation is in the valleys of the Milk and Missouri Rivers. From the Milk River valley the landscape rises to the north and south. The northwestern part of the county and the Larb Hills in the southwestern part have an elevation of almost 3,000 feet.

Geologic formations of clay shale and sandstone occur in the county. Alluvium of recent age is in the stream valleys of the Milk and Missouri Rivers and their larger tributaries. High plateaus, known as the Flaxville Plateaus, occur in the northeastern part of the county. They are several hundred feet higher than the surrounding landscape. These plateaus are old alluvium consisting of water-rounded argillite and quartzite gravel and cobbles along with sand, silt, and clay. The plateaus are nearly level to gently undulating.

Sandstone underlies the plateaus and is exposed below the plateau in several areas. It is also exposed in the eastern part of the county in the breaks along Little Porcupine and Cottonwood Creeks. In the north-central part of the county, sandstone occurs at the head of Big Porcupine Creek and along the western slopes of the Flaxville Plateau, extending north to Canada. In the southern part of the county, sandstone overlies the clay shale formation in a rugged area east of Timber Creek known as the Larb Hills. It also occurs in the west-central part of the county and is exposed as steep escarpments on hillsides above the Milk River Valley and along the Larb and Rock Creek stream valleys.

Clay shale is the most extensive geologic formation in the county. It extends from Canada to Fort Peck Reservoir and throughout most of the county, except in the northeastern and west-central parts. It lies below the sandstone formation in the southwest. The shale consists of dark gray clayey shales of marine origin. It is covered with glacial till in the central and much of the northern parts of the county, except along some deeply cut stream valleys and drainageways. In the southern part of the county, large areas of it occur at or near the surface.

The county is in an area once covered by continental glaciation from the Keewatin ice sheet. Two stages of glaciation are believed to have occurred. In the first stage, glaciation extended throughout the county and south past the present Missouri River valley. In the second stage, it was less extensive. It covered most of the northern part of the county and as far south as the present Milk River valley. A mantle of glacial till was deposited by the glaciers throughout most of the county over the formations of shale and sandstone. Glacial till is extensive north of the Milk and Missouri Rivers to about 5 to 10 miles south of the Milk River valley. The southern part of the county has a few areas of till and some cobble and stone, giving evidence of past glaciation. Most of the glacial till in the south has been eroded away by postglacial erosion.

The topography of the central and northern parts of the county is predominately an undulating to rolling glacial till plain. Some small lakes and ponds occur intermittently in areas that lack surface drainage. Stream drainageways are fairly well established in the landscape, and in some areas they have carved deep stream valleys and have exposed the underlying shale and sandstone.

The southern part of the county has large areas of rough landscape dissected by streams, where numerous drainageways have cut into the shale. The rougher landscape occurs along the Timber Creek drainageway and in the area between Willow Creek and Fort Peck Reservoir. This area has numerous steep, deeply cut valleys, where drainageways cut into the shale. Shale

outcrops occur along sides of drains, on ridgetops and on some rounded hilltops. This area is undergoing active geologic erosion.

All of the streams in the county flow into the Milk or Missouri Rivers. Fort Peck Dam, located 19 miles southeast of Glasgow on the Missouri River, impounds water in the Fort Peck Reservoir. The reservoir extends over 100 miles upstream from the dam covering the former Missouri River flood plain. The Milk River flows into the county near the center of the western boundary. It proceeds southeasterly through the south-central part of the county and empties into the Missouri River a few miles below Nashua. The Milk River is a sluggish stream about 100 feet in width and flows 15 to 25 feet below the flood plain most of the year. More water flows during the spring of the year, and sometimes it overflows the banks causing some flooding. The stream valley gradient is about 2 feet per mile and about 1 foot per river mile. The river is a meandering stream with many abandoned oxbow channels along its course. The valley of the Milk River varies in width from 1 to 4 miles. The average width is 2 miles.

The valley floor is nearly level. In preglacial times the Missouri River flowed in the valley now occupied by the Milk River. Most of the streams in the county drain into the Milk River. The main tributaries of the Milk River draining the northern part of the county are Rock, Lime, Buggy, Cherry, and Porcupine Creeks. Beaver, Larb, Antelope, Brazil, and Willow Creeks flow into the Milk River from the south and west and drain most of the southern part of the county. Timber, Sutherland, and Duck Creeks and several other minor tributaries drain the extreme southern part of the county. They flow to the south and southeast into Fort Peck Reservoir.

The extreme northeast corner of the county is drained by the West Fork of the Poplar River. It flows southeasterly into Daniels and Roosevelt Counties and into the Missouri River near the town of Poplar. Little Porcupine Creek drains the east-central part of the county and flows into the Missouri River near Frazer. The Missouri and Milk Rivers are the only streams in the county that move a significant amount of water throughout the year.

Climate

The climate of Valley County is of the continental type with a large annual range in temperature and limited precipitation. Warm summers, cold winters, moist spring weather and relatively light precipitation during the cold season is typical for the area.

The county is quite large and has fairly well defined annual average temperature differences between southern and northern boundaries. The difference in latitude from south to north appears to be the reason for climatic variations more than topography; however, the hills and valleys affect drainage, winds, and nighttime temperatures. Areas in the southern part of the county annually average 2 or 3 degrees warmer than in the northern end of the county. Midsummer high temperatures average in the mideighties in the south to about 80 degrees in the north. Midwinter low temperatures range from around 0 degrees in the south to 5 below zero along the Canadian border. The average temperature range across the county is quite consistent from month to month.

Winters are usually quite cold. The average temperatures at Glasgow through the winter months of December through February is 13.7° F. The coldest temperature ever recorded was −59° in February 1936. Mild winter weather occurs occasionally. This change is sometimes caused when the "chinook" or "foehn" wind, which descends the eastern slopes of the Rocky Mountains, reaches Valley County. Very cold weather also occurs at least once each winter, but usually lasts for only a few days.

Summers are characterized by warm, sunny weather, which may last for several weeks at a time. The average normal summer temperature for June through August is 66.9°. Sunny weather predominates during the summer, but periods of cloudy weather and showers occur, usually in the afternoons and evenings. A few days of very hot weather in July and August occur at times, but ordinarily do not last very long. The number of days with temperatures of 90° or more average from about 10 a year in the northern parts of the county to about 25 in the southern part. Temperatures of well over 100° have been recorded throughout the county. The warmest temperature ever recorded in Glasgow was 113° in July 1900. The hot weather is usually accompanied by low humidity.

The frost-free season is about 124 days at Glasgow from May 19 to September 20 on the average. It is about 100 days at Opheim. Because Opheim is farther north and at a higher elevation, the frost-free season is shorter. The frost-free season ranges from 110 to 130 days throughout most of the county. The northeastern part of the county has a frost-free season of around 100 to 110 days.

Precipitation averages 10 to 14 inches for the county. The normal annual precipitation for Glasgow is 10.87 inches. About 8.53 inches, or 78 percent of this amount, usually falls during April through September; 4.03 inches, or 37 percent of the nearly normal annual precipitation usually falls during May and June. This time distribution of precipitation helps make the climate favorable for growing small grains. Winter precipitation nearly always falls as snow, which seldom accumulates to any great depth. It is usually blown into drifts, in the open unprotected areas. Table 8 shows temperature and precipitation data, the number of days with snow cover, and the average depth of snow. Table 9 shows the probabilities of freezing temperatures on specified dates.

Several kinds of storms occur in Valley County with some frequency. Blizzards occur occasionally during the winter but usually are of short duration; however, it is wise for travelers, stockmen, and others to be on the alert for this danger. During the summer thunderstorms sometimes bring gusty winds, lightning, cloudbursts, and hail. In most years storms damage crops to some extent; however, the damage is seldom widespread. Strong winds, other than those with thunderstorms, occur but are infrequent. Estimates based on the fastest mile indicate that winds of about 70 to 75 mph will occur on the average of once in 50 years. Heavy general rains in the spring and rapid snow melt in early spring, either singly or in combination, may

TABLE 8.—*Temperature and precipitation*

[All data from Glasgow Weather Bureau, Glasgow, Montana. Period of record, 1961–70, except for average daily temperature and total precipitation, which are 1941–70. T means trace]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with— Maximum temperature equal to or higher than—	Two years in 10 will have at least 4 days with— Minimum temperature equal to or lower than—	Average total	One year in 10 will have— Less than—	One year in 10 will have— More than—	Number of days with snow cover	Average depth of snow on days with snow cover
	°F	°F	°F	°F	Inches	Inches	Inches		Inches
January	18.9	−0.5	48	−26	0.39	0.1	1.2	25	4
February	25.4	5.0	52	−14	.32	.1	.5	20	5
March	35.6	14.8	65	−16	.37	.1	.8	16	4
April	55.0	30.6	74	16	.71	.3	2.0	4	2
May	66.7	41.7	83	27	1.31	.3	3.2	0	
June	73.9	50.1	91	39	2.72	.9	5.4	0	
July	84.3	56.6	96	48	1.43	.2	5.2	0	
August	83.0	54.9	99	45	1.51	.1	3.7	0	
September	70.4	44.0	90	29	.85	.3	2.2	0	
October	59.2	33.6	78	22	.56	T	1.2	1	(1)
November	39.1	18.9	61	0	.39	T	.4	3	1
December	26.5	7.6	49	−17	.31	.1	.7	16	2
Year	53.2	29.8			10.87			85	4

[1] Less than 1 inch.

TABLE 9.—*Freeze dates in spring and fall*

[All data from Glasgow Weather Bureau, Glasgow, Montana. Period of record, 1961–1970]

Probability	Dates for given probability and temperature		
	24° F or lower	28° F or lower	32° F or lower
Spring:			
1 year in 10 later than	May 2	May 19	May 21
2 years in 10 later than	April 27	May 4	May 20
5 years in 10 later than	April 12	April 19	May 8
Fall:			
1 year in 10 earlier than	September 30	September 9	September 9
2 years in 10 earlier than	October 17	September 13	September 10
5 years in 10 earlier than	October 26	September 27	September 22

cause severe flooding along the Milk River and some of its tributaries about once in 20 or 30 years.

Natural resources

The most valuable natural resources in the county are its soil and water, which are used to produce cash crops and livestock. Water is also used to irrigate crops and for recreation.

Natural gas from the Bowdoin gas field in western Valley County and part of Phillips County is also a major natural resource. Most of the homes in the county are heated by natural gas. Bentonite deposits are in the southwestern part of the county.

Settlement, farming, and ranching

The area surrounding what is now known as Valley County was once the domain of the Gros Ventre and Assiniboine Indians. It contained many kinds of wildlife including thousands of buffalo. In 1743 it was visited by a French exploring party, which was seeking furs. In May 1805 the Lewis and Clark Expedition came up the Missouri River and passed through the area. The Missouri and Milk Rivers were natural routes for the early trappers and traders, who began to come into the area after the Lewis and Clark Expedition.

Cattlemen came to the area with the establishment

of the Fort Peck Indian Reservation in 1877. In the same year, the railroad was established. The town of Glasgow grew up as a stop along the railroad. In 1893, Valley County was created, and the town of Glasgow was named as the county seat.

Today, Glasgow is the largest town in Valley County, and in 1970 had a population of 4,700. In 1970 the entire county had a population of 11,471. The rest of the towns contain fewer than 1,000 people each.

Homesteaders came into the county in the early 1900's. Thousands of acres of land were plowed and seeded to grain during the 1920's and 1930's. During this period, many of the dryland farmers on small farms went broke and had to abandon their farms. Since then, improved farming methods, larger farms, and diversified farming, have stabilized the agricultural economy of the county.

At the present time, about 25 percent of the county is used for crops and pasture. About 760,000 acres were dryfarmed in 1974 and about 40,000 acres were irrigated. About 75 percent of the acreage of the county is range. Table 10 compares the number of acres of major irrigated and dryfarmed crops in the county in 1965 and 1973.

A comparison of livestock raised in the county in 1965 with those raised in 1973 shows an increase in the number of cattle and swine and a decrease in the number of sheep and chickens. In 1965 there were 83,000 cattle and calves; 25,000 sheep and lambs; 3,900 hogs and pigs; and 25,900 chickens. In 1973 there were 93,900 cattle and calves; 12,800 sheep and lambs; 4,500 hogs and pigs; and 10,600 chickens.

Industry, markets, and transportation

Two important developments that have taken place in Valley County were the construction of Fort Peck Dam and Glasgow Air Force Base.

On October 14, 1933, President Franklin D. Roosevelt approved the construction of Fort Peck Dam on the Missouri River. The dam was constructed by the Corps of Engineers, and at that time was considered to be the largest earth filled dam in the world. It is a multipurpose project providing flood control, hydroelectric power, and recreation. Electric power, generated at Fort Peck Dam, supplies electricity for the county and areas outside the county.

Glasgow Air Force Base is a defense department installation located 18 miles north of Glasgow. Construction began in 1954. In 1968 the base was closed. Since then, it has been reopened and, at the present time, limited use is being made of the base.

Grain is marketed at elevators in several towns in the county, and a stockyard at Glasgow provides the area with good livestock marketing facilities.

Several trucking firms are located in Glasgow, providing motor transport service to the county. U.S. Highway 2 crosses the county from east to west along the Milk and Missouri River valleys. Highway 247 connects Highway 2 east of Glasgow and goes north to Glasgow Air Force Base, Opheim, and Canada. Highway 24 also connects Highway 2 east of Glasgow and goes south to Fort Peck Dam and out of the county. Glasgow has daily bus service and the Glasgow International Airport, north of the city, provides daily airline service.

References

(1) American Association of State Highway [and Transportation] Officials. 1970. *Standard Specifications for Highway Materials and Methods of Sampling and Testing*, Ed. 10, 2 v., illus.

(2) American Society for Testing Materials. 1974. Methods for classification of soils for engineering purposes. ASTM Stand. D2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(3) United States Department of Agriculture. 1951. *Soil Survey Manual*, U.S. Dept. Agr. Handbook 18, 503 pp., illus.

(4) United States Department of Agriculture. 1975. *Soil Taxonomy: A Basic System of Soil Classification for Making and Interpreting Soil Surveys.* Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil that has so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

TABLE 10.—*Acreage of principal crops harvested in 1965 and 1973*

Crop	1965			1973		
	Dryfarmed	Irrigated	Total	Dryfarmed	Irrigated	Total
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Alfalfa hay	5,500	15,600	21,100	12,000	22,300	34,300
Corn for silage	200	600	800	400	2,100	2,500
Winter wheat	7,900	200	8,100	12,100	100	12,200
Spring wheat	220,600	3,900	224,500	259,700	2,100	261,800
Oats	9,800	1,300	11,100	13,400	900	14,300
Barley	72,400	1,800	74,200	71,700	1,200	72,900

Area reclaim. An area that is difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	More than 7.5

Badland. Steep or very steep, commonly nonstony barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material that has base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A map unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of

roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a castastrophe in nature, for example, fire, that exposes a bare surface.

Excess alkali. Excess exchangeable sodium. The resulting poor physical properties restrict the growth of plants.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime. Excess carbonates. Excessive carbonates, or lime, restrict the growth of some plants.

Excess salts. Excess water soluble salts. Excessive salts restrict the growth of most plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. None means that flooding is not probable; rare that it is unlikely but possible under unusual weather conditions; occasional that it occurs on an average of once or less in 2 years; and frequent that it occurs on an average of more than once in 2 years. Duration is expressed as very brief if less than 2 days, brief if 2 to 7 days, and long if more than 7 days. Probable dates are expressed in months; November–May, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes of soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from glacial ice.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes by water originating mainly from the melting of glacial ice. Many are interbedded or laminated.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Gypsum. Hydrous calcium sulphate.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range of geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals

as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of the C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants are those that follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—few, common, and many; size—fine, medium, and coarse; and contrast—faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by water that originated mainly from the melting of glacial ice. Glacial outwash is commonly in valleys on landforms known as valley trains, outwash terraces, eskers, kame terraces, kames, outwash fans, or deltas.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are very slow (less than 0.06 inch), slow (0.06 to 0.20 inch), moderately slow (0.2 to 0.6 inch), moderate (0.6 to 2.0 inches), moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20 inches), and very rapid (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the basis of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water forms subsurface tunnels or pipelike cavities in the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range (or rangeland). Land that, for the most part, produces native plants suitable for grazing by livestock; includes land supporting some forest trees.

Range condition. The health or productivity of forage plants on a given range, in terms of the potential productivity under normal climate and the best practical management. Condition classes generally recognized are excellent, good, fair, and poor. The classification is based on the percentage of original, or assumed, climax vegetation on a site, as compared to what has been observed to grow on it when well managed.

Range site. An area of range where climate, soil, and relief are sufficiently uniform to produce a distinct kind and amount of native vegetation.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH		pH
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called groundwater runoff or seepage flow from ground water.

Saline-alkali soil. A soil that contains a harmful concentration of salts and exchangeable sodium; contains harmful salts and is strongly alkaline; or contains harmful salts and exchangeable sodium and is very strongly alkaline. The salts, exchangeable sodium, and alkaline reaction are in the soil in such location that growth of most crop plants is less than normal.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeters to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeters) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. The slope classes used in this survey are as follows:

	Percent
Nearly level	0–2
Gently sloping (undulating)	2–5
Moderately sloping (gently rolling)	5–9
Strongly sloping (strongly rolling)	9–15
Moderately steep (hilly)	15–35
Steep	35+

Slow intake. The slow movement of water into the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: very coarse sand (2.0 millimeters to 1.0 millimeter); coarse sand (1.0 to 0.5 millimeter); medium sand (0.5 to 0.25 millimeter); fine sand (0.25 to 0.10 millimeter); very fine sand (0.10 to 0.05 millimeter); silt (0.05 to 0.002 millimeter); and clay (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in a mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil, or partly worked into the soil, to provide protection from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use or management.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Underlying material. That soil material which directly underlies the solum. The C horizon.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within 1 year; specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

GUIDE TO MAP UNITS

For a full description of a map unit, read both the description of the map unit and that of the soil series to which the map unit belongs. In referring to a capability unit, a range site, or a windbreak suitability group, read the introduction to the section it is in for general information about its management.

Map symbol	Map unit	Page	Capability unit Dryland Symbol	Dryland Page	Irrigated Symbol	Irrigated Page	Range site Name	Range site Page	Windbreak suitability group Number	Windbreak Page
1	Absher-Vaeda complex, 1 to 5 percent slopes	8	VIs-1	46	------	--	Dense Clay	54	--	--
	Absher clay loam	--	------	--	------	--	--------------	--	3S	50
	Vaeda silty clay	--	------	--	------	--	--------------	--	4	50
2	Aquic Ustifluvents, saline	8	VIw-1	45	------	--	Saline Lowland	52	4	50
3	Attewan loam, 0 to 4 percent slopes	9	IIIs-3	44	------	--	Silty	52	3M	50
4	Badland	9	VIII	46	------	--	--------------	--	--	--
5	Bowdoin clay	10	VIs-1	46	VIs-1	43	Dense Clay	54	4	50
6	Cabbart-Delpoint complex, 9 to 35 percent slopes	10	VIIe-1	46	------	--	--------------	--	4	50
	Cabbart loam	--	------	--	------	--	Shallow	54	--	--
	Delpoint loam	--	------	--	------	--	Silty	52	--	--
7	Elloam clay loam, 1 to 5 percent slopes	13	IVs-3	45	------	--	Dense Clay	54	3S	50
8	Elloam gravelly clay, 2 to 9 percent slopes	13	VIs-1	46	------	--	Dense Clay	54	4	50
9	Elloam-Sunburst clay loams, 9 to 35 percent slopes	14	VIe-1	45	------	--	--------------	--	4	50
	Elloam clay loam	--	------	--	------	--	Dense Clay	54	--	--
	Sunburst clay loam	--	------	--	------	--	Thin Hilly	53	--	--
10	Evanston loam, 0 to 2 percent slopes	14	IIIe-1	43	------	--	Silty	52	1	47
11	Evanston loam, 2 to 9 percent slopes	14	IIIe-1	43	------	--	Silty	52	1	47
12	Evanston loam, sandstone substratum, 2 to 5 percent slopes	14	IIIe-1	43	------	--	Silty	52	1	47
13	Evanston-Lonna loams, 2 to 9 percent slopes	15	IIIe-1	43	------	--	Silty	52	1	47
14	Evanston-Marias complex, 3 to 9 percent slopes	15	IVe-3	45	------	--	--------------	--	1	47
	Evanston loam	--	------	--	------	--	Silty	52	--	--
	Marias clay	--	------	--	------	--	Clayey	53	--	--
15	Evanston-Marmarth loams, 3 to 12 percent slopes	15	IVe-3	45	------	--	Silty	52	--	--
	Evanston loam	--	------	--	------	--	--------------	--	1	47
	Marmarth loam	--	------	--	------	--	--------------	--	2M	47
16	Farnuf loam, 0 to 5 percent slopes	16	IIIe-2	43	------	--	Silty	52	1	47
17	Farnuf loam, 5 to 9 percent slopes	16	IIIe-2	43	------	--	Silty	52	1	47
18	Farnuf loam, gravelly substratum, 0 to 5 percent slopes	16	IIIe-2	43	------	--	Silty	52	2M	47
19	Farnuf-Reeder loams, 2 to 5 percent slopes	16	IIIe-2	43	------	--	Silty	52	--	--
	Farnuf loam	--	------	--	------	--	--------------	--	1	47
	Reeder loam	--	------	--	------	--	--------------	--	2M	47
20	Farnuf-Tinsley-Reeder association, hilly	16	------	--	------	--	--------------	--	--	--
	Farnuf loam	--	IVe-3	45	------	--	Silty	52	1	47
	Tinsley very gravelly sandy loam	--	VIe-1	45	------	--	Gravel	54	4	50
	Reeder loam	--	IVe-3	45	------	--	Silty	52	2M	47
21	Fluvaquentic Haploborolls, gently sloping	16	VIw-1	45	------	--	Subirrigated	51	4	50
22	Harlem silty clay loam	17	IIIs-2	44	IIs-1	42	Clayey	53	1	47
23	Harlem clay	18	IIIs-2	44	IIIs-1	43	Clayey	53	1	47
24	Harlem clay, wet	18	------	--	IIIw-1	43	--------------	--	2S	50
25	Havre silty clay loam	18	IIIe-1	43	IIe-1	42	Clayey	53	1	47
26	Havre-Glendive complex	18	IIIe-1	43	IIe-1	42	--------------	--	--	--
	Havre silty clay loam	--	------	--	------	--	Clayey	53	1	47
	Glendive loam	--	------	--	------	--	Silty	52	2M	47

Map symbol	Map unit	Page	Capability unit Dryland Symbol	Dryland Page	Irrigated Symbol	Irrigated Page	Range site Name	Range site Page	Windbreak suitability group Number	Windbreak suitability group Page
27	Havre-Harlem silty clays	19	IIIs-2	44	IIs-1	42	Clayey	53	1	47
28	Havre-Rivra complex	19	IVs-4	45	------	--	--------------	--	--	--
	Havre clay loam	--	------	--	------	--	Clayey	53	1	47
	Rivra clay loam	--	------	--	------	--	Shallow to Gravel	53	4	50
29	Hillon loam, 15 to 35 percent slopes	20	VIe-1	45	------	--	Thin Hilly	53	4	50
30	Hillon-Telstad loams, 9 to 15 percent slopes	20	IVe-3	45	------	--	Silty	52	1	47
31	Judith-Martinsdale loams, 5 to 15 percent slopes	20	IVe-3	45	------	--	Silty	52	--	--
	Judith loam	--	------	--	------	--	--------------	--	3L	50
	Martinsdale loam	--	------	--	------	--	--------------	--	2L	47
32	Lallie silty clay	21	------	--	IIIw-1	43	Wetland	51	4	50
33	Lihen loamy fine sand, 2 to 9 percent slopes	21	VIe-2	45	------	--	Sands	52	4	50
34	Lisam-Dilts clays, 5 to 35 percent slopes	22	VIIe-1	46	------	--	Shallow Clay	53	4	50
35	Lisam-Dilts-Rock outcrop complex, 9 to 35 percent slopes	22	VIIe-1	46	------	--	--------------	--	--	--
	Lisam clay	--	------	--	------	--	Shallow Clay	53	4	50
	Dilts clay	--	------	--	------	--	Shallow Clay	53	4	50
	Rock outcrop	--	------	--	------	--	--------------	--	--	--
36	Lonna silt loam, 1 to 3 percent slopes	23	IIIe-1	43	------	--	Silty	52	1	47
37	Lonna-Marias complex, 1 to 3 percent slopes	23	IIIe-1	43	------	--	--------------	--	1	47
	Lonna silt loam	--	------	--	------	--	Silty	52	--	--
	Marias clay	--	------	--	------	--	Clayey	53	--	--
38	Marias clay, 1 to 9 percent slopes	23	IIIe-1	43	------	--	Clayey	53	1	47
39	Marmarth-Cabbart loams, 5 to 25 percent slopes	24	VIe-1	45	------	--	--------------	--	4	50
	Marmarth loam	--	------	--	------	--	Silty	52	--	--
	Cabbart loam	--	------	--	------	--	Shallow	54	--	--
40	Martinsdale loam, 1 to 5 percent slopes	25	IIIe-2	43	------	--	Silty	52	2L	47
41	Martinsdale-Judith loams, 1 to 5 percent slopes	25	IIIe-2	43	------	--	Silty	52	--	--
	Martinsdale loam	--	------	--	------	--	--------------	--	2L	47
	Judith loam	--	------	--	------	--	--------------	--	3L	50
42	Nishon loam	26	IIIw-2	44	------	--	Overflow	52	3S	50
43	Nobe clay	26	VIIs-1	46	------	--	Saline Upland	54	4	50
44	Nobe-Absher complex, 0 to 3 percent slopes	26	VIIs-1	46	------	--	--------------	--	--	--
	Nobe clay	--	------	--	------	--	Saline Upland	54	4	50
	Absher clay loam	--	------	--	------	--	Dense Clay	54	3S	50
45	Parshall sandy loam, 1 to 5 percent slopes	27	IVe-1	44	------	--	Sandy	52	2M	47
46	Phillips loam, 0 to 5 percent slopes	28	IIIe-1	43	------	--	Silty	52	1	47
47	Phillips-Elloam complex, 1 to 9 percent slopes	28	IVe-2	45	------	--	--------------	--	--	--
	Phillips loam	--	------	--	------	--	Silty	52	1	47
	Elloam clay loam	--	------	--	------	--	Dense Clay	54	3S	50
48	Phillips-Nobe-Absher complex, 1 to 5 percent slopes	28	VIs-1	46	------	--	--------------	--	--	--
	Phillips loam	--	------	--	------	--	Silty	52	1	47
	Nobe clay	--	------	--	------	--	Saline Upland	54	4	50
	Absher clay loam	--	------	--	------	--	Dense Clay	54	3S	50
49	Phillips-Scobey complex, 2 to 9 percent slopes	28	IIIe-1	43	------	--	Silty	52	1	47
50	Phillips-Telstad loams, 2 to 9 percent slopes	28	IIIe-1	43	------	--	Silty	52	1	47

GUIDE TO MAP UNITS--Continued

Map symbol	Map unit	Page	Capability unit: Dryland Symbol	Dryland Page	Irrigated Symbol	Irrigated Page	Range site: Name	Page	Windbreak suitability group: Number	Page
51	Phillips-Thoeny loams, 0 to 2 percent slopes	29	IIIs-3	44	------	--	--------------	--	--	--
	Phillips loam	--	------	--	------	--	Silty	52	1	47
	Thoeny loam	--	------	--	------	--	Dense Clay	54	3S	50
52	Redvale loam, 0 to 3 percent slopes	29	IIIs-3	44	------	--	Silty	52	3M	50
53	Reeder-Cambert-Doney complex, 2 to 9 percent slopes	30	IVe-3	45	------	--	Silty	52	2M	47
54	Reeder-Doney-Cambert complex, 9 to 35 percent slopes	30	VIe-1	45	------	--	--------------	--	--	--
	Reeder loam	--	------	--	------	--	Silty	52	2M	47
	Doney loam	--	------	--	------	--	Thin Hilly	53	4	50
	Cambert silt loam	--	------	--	------	--	Thin Hilly	53	4	50
55	Rock outcrop	31	VIII	46	------	--	--------------	--	--	--
56	Savage clay loam, 0 to 3 percent slopes	31	IIIs-3	44	------	--	Silty	52	1	47
57	Scobey clay loam, 1 to 9 percent slopes	32	IIIe-1	43	------	--	Silty	52	1	47
58	Scobey stony clay loam, 2 to 15 percent slopes	32	VIs-2	46	------	--	Silty	52	4	50
59	Scobey-Sunburst clay loams, 5 to 25 percent slopes	33	VIe-1	45	------	--	--------------	--	--	--
	Scobey clay loam	--	------	--	------	--	Silty	52	1	47
	Sunburst clay loam	--	------	--	------	--	Thin Hilly	53	4	50
60	Sunburst clay loam, 9 to 35 percent slopes	33	VIe-1	45	------	--	Thin Hilly	53	4	50
61	Sunburst-Lisam complex, 9 to 35 percent slopes	33	VIIe-1	46	------	--	--------------	--	4	50
	Sunburst clay loam	--	------	--	------	--	Thin Hilly	53	--	--
	Lisam clay	--	------	--	------	--	Shallow Clay	53	--	--
62	Tally sandy loam, 2 to 5 percent slopes	34	IIIe-3	44	------	--	Sandy	52	2M	47
63	Tally-Dooley sandy loams, 0 to 5 percent slopes	34	IIIe-3	44	------	--	Sandy	52	--	--
	Tally sandy loam	--	------	--	------	--	--------------	--	2M	47
	Dooley sandy loam	--	------	--	------	--	--------------	--	1	47
64	Tally-Dooley sandy loams, 5 to 15 percent slopes	34	IVe-1	44	------	--	Sandy	52	--	--
	Tally sandy loam	--	------	--	------	--	--------------	--	2M	47
	Dooley sandy loam	--	------	--	------	--	--------------	--	1	47
65	Telstad loam, 1 to 9 percent slopes	35	IIIe-1	43	------	--	Silty	52	1	47
66	Thebo clay, 2 to 9 percent slopes	36	IVe-3	45	------	--	Clayey	53	2M	47
67	Thebo-Elloam clays, 2 to 9 percent slopes	36	IVe-3	45	------	--	--------------	--	--	--
	Thebo clay	--	------	--	------	--	Clayey	53	2M	47
	Elloam clay	--	------	--	------	--	Dense Clay	54	3S	50
68	Thebo-Lisam clays, 2 to 15 percent slopes	36	VIe-1	45	------	--	--------------	--	--	--
	Thebo clay	--	------	--	------	--	Clayey	53	2M	47
	Lisam clay	--	------	--	------	--	Shallow Clay	53	4	50
69	Thoeny-Phillips complex, 1 to 5 percent slopes	37	IVe-2	45	------	--	--------------	--	--	--
	Thoeny loam	--	------	--	------	--	Dense Clay	54	3S	50
	Phillips loam	--	------	--	------	--	Silty	52	1	47
70	Tinsley complex, 9 to 35 percent slopes	37	VIe-1	45	------	--	Gravel	54	4	50
71	Tinsley-Reeder-Doney complex, 9 to 35 percent slopes	37	VIe-1	45	------	--	--------------	--	--	--
	Tinsley very gravelly sandy loam	--	------	--	------	--	Gravel	54	4	50
	Reeder loam	--	------	--	------	--	Thin Hilly	53	2M	47
	Doney loam	--	------	--	------	--	Thin Hilly	53	4	50
72	Turner loam, 0 to 2 percent slopes	38	IIIs-3	44	------	--	Silty	52	3M	50
73	Turner and Farnuf loams, wet, 0 to 2 percent slopes	38	IIIw-3	44	------	--	Subirrigated	51	2W	50

Map symbol	Map unit	Page	Capability unit: Dryland Symbol	Dryland Page	Irrigated Symbol	Irrigated Page	Range site Name	Range site Page	Windbreak suitability group Number	Windbreak suitability group Page
74	Typic Fluvaquents, gently sloping----------	38	VIw-1	45	------	--	Wetland	51	4	50
75	Ustic Torrifluvents, gently sloping--------	38	VIw-1	45	------	--	Overflow	52	4	50
76	Vaeda silty clay---------------------------	39	VIs-1	46	------	--	Dense Clay	54	4	50
77	Williams loam, 2 to 9 percent slopes-------	40	IIIe-2	43	------	--	Silty	52	1	47

☆U.S. GPO: 1984-270-802/10027

Accessibility Statement

The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The USDA Target Center can convert USDA information and documents into alternative formats, including Braille, large print, video description, diskette, and audiotape. For more information, visit the TARGET Center's Web site (http://www.targetcenter.dm.usda.gov/) or call (202) 720-2600 (Voice/TTY).

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

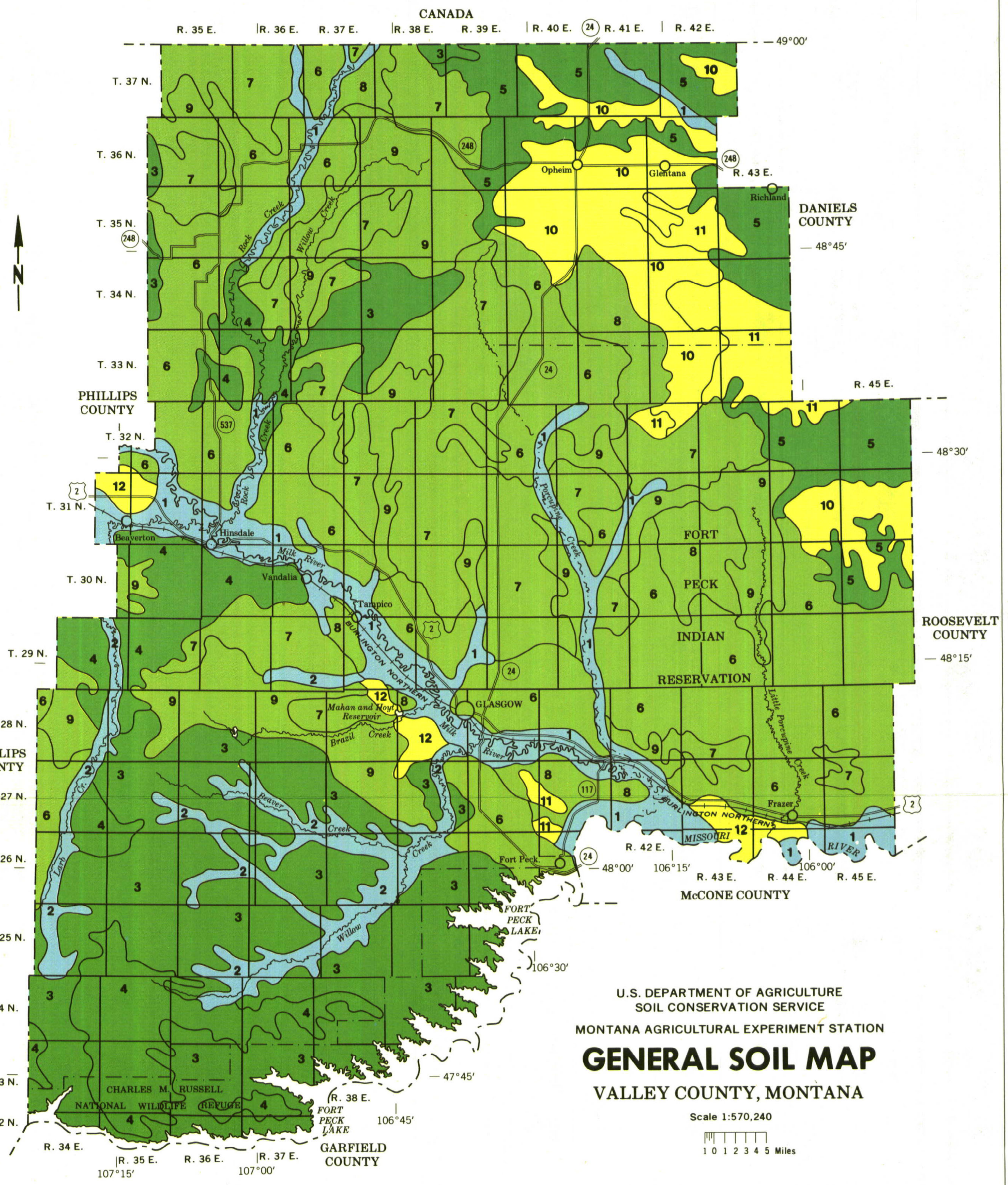
To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).



U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
MONTANA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

VALLEY COUNTY, MONTANA

MAP UNITS

AREAS DOMINATED BY NEARLY LEVEL AND GENTLY SLOPING, DEEP, WELL DRAINED SOILS ON THE FLOOD PLAINS, FANS, AND LOW TERRACES

1 Harlem-Havre-Bowdoin: Nearly level soils formed in alluvium on flood plains and low terraces

2 Vaeda-Absher: Nearly level and gently sloping soils formed in alluvium on fans and low terraces

AREAS DOMINATED BY NEARLY LEVEL TO HILLY, SHALLOW TO DEEP, WELL DRAINED SOILS ON THE SHALE AND SANDSTONE UPLANDS

3 Lisam-Dilts-Rock outcrop: Shallow, undulating to hilly soils formed in material weathered from shale, and Rock outcrop, on uplands

4 Cabbart-Delpoint-Evanston: Deep to shallow, gently sloping to hilly soils formed in material weathered from sandstone and in alluvium on uplands

5 Reeder-Farnuf-Cambert: Deep and moderately deep, nearly level to hilly soils formed in alluvium and material weathered from sandstone on uplands

AREAS DOMINATED BY NEARLY LEVEL TO HILLY, SHALLOW TO DEEP, WELL DRAINED SOILS ON THE GLACIATED PLAINS AND SHALE UPLANDS

6 Phillips-Scobey-Sunburst: Deep, nearly level to hilly soils formed in glacial till on uplands

7 Phillips-Elloam-Thoeny: Deep, nearly level to strongly sloping soils formed in glacial till on uplands

8 Telstad-Phillips: Deep, nearly level to strongly rolling soils formed in glacial till on uplands

9 Elloam-Lisam-Sunburst: Shallow to deep, nearly level to hilly soils formed in material weathered from clay shale and in glacial till on uplands

AREAS DOMINATED BY NEARLY LEVEL TO STRONGLY ROLLING, DEEP, WELL DRAINED SOILS ON ALLUVIAL FANS AND TERRACES AND GLACIATED PLAINS

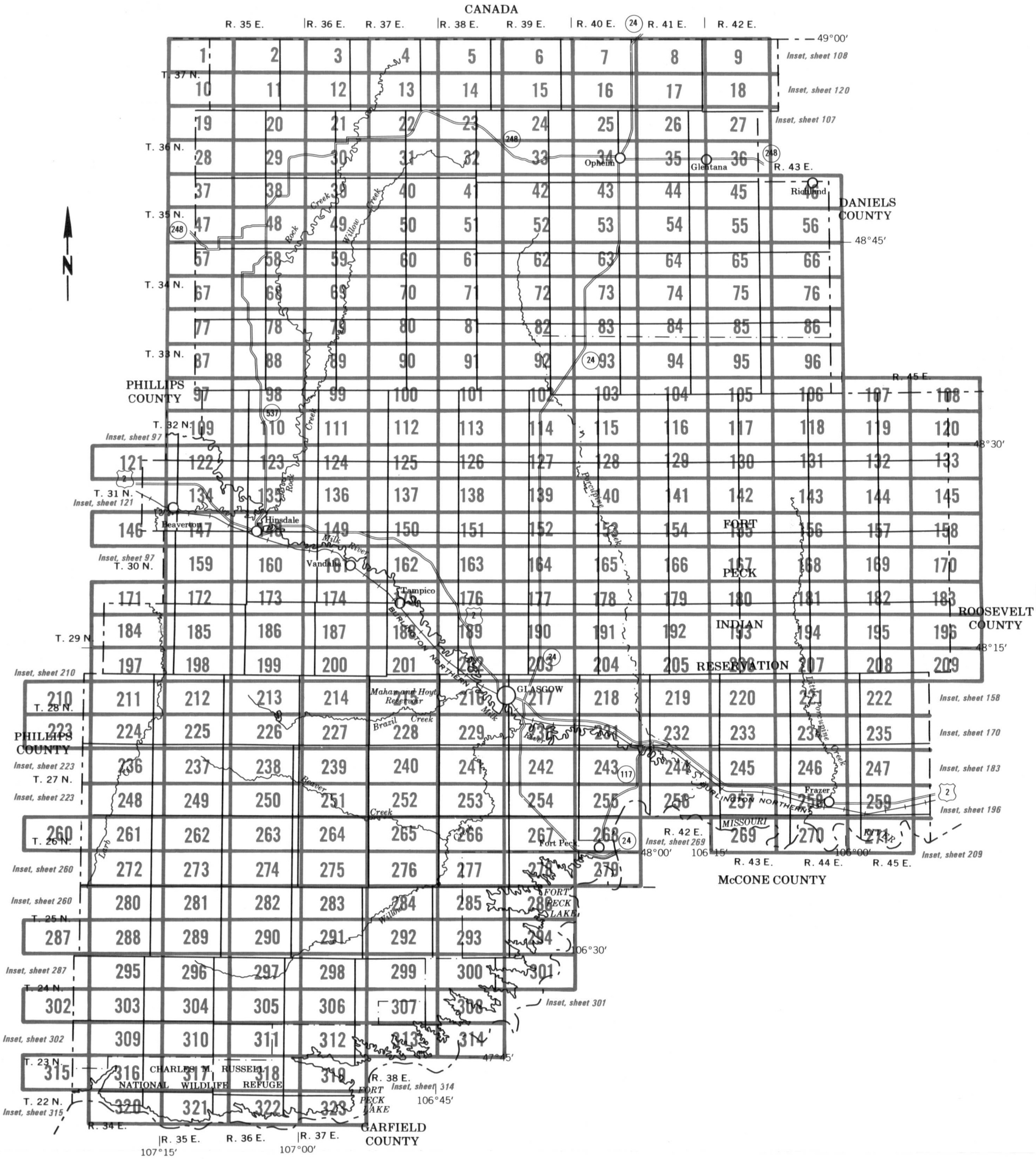
10 Williams-Farnuf-Martinsdale: Nearly level to strongly rolling soils formed in glacial till and alluvium on uplands

11 Tally-Dooley: Nearly level to strongly rolling soils formed in alluvium on uplands

12 Marias: Nearly level to gently rolling soils formed in alluvium on uplands

Compiled 1979

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

VALLEY COUNTY, MONTANA

Scale 1:570,240

1 0 1 2 3 4 5 Miles

SOIL LEGEND

SYMBOL	NAME
1	Absher-Vaeda complex, 1 to 5 percent slopes
2	Aquic Ustifluvents, saline
3	Attewan loam, 0 to 4 percent slopes
4	Badland
5	Bowdoin clay
6	Cabbart-Delpoint complex, 9 to 35 percent slopes
7	Elloam clay loam, 1 to 5 percent slopes
8	Elloam gravelly clay, 2 to 9 percent slopes
9	Elloam-Sunburst clay loam, 9 to 35 percent slopes
10	Evanston loam, 0 to 2 percent slopes
11	Evanston loam, 2 to 9 percent slopes
12	Evanston loam, sandstone substratum, 2 to 5 percent slopes
13	Evanston-Lonna loams, 2 to 9 percent slopes
14	Evanston-Marias complex, 3 to 9 percent slopes
15	Evanston-Marmarth loams, 3 to 12 percent slopes
16	Farnuf loam, 0 to 5 percent slopes
17	Farnuf loam, 5 to 9 percent slopes
18	Farnuf loam, gravelly substratum, 0 to 5 percent slopes
19	Farnuf-Reeder loams, 2 to 5 percent slopes
20	Farnuf-Tinsley-Reeder association, hilly
21	Fluvaquentic Haploborolls, gently sloping
22	Harlem silty clay loam
23	Harlem clay
24	Harlem clay, wet
25	Havre silty clay loam
26	Havre-Glendive complex
27	Havre-Harlem silty clays
28	Havre-Rivra complex
29	Hillon loam, 15 to 35 percent slopes
30	Hillon-Telstad loams, 9 to 15 percent slopes
31	Judith-Martinsdale loams, 5 to 15 percent slopes
32	Lallie silty clay
33	Lihen loamy fine sand, 2 to 9 percent slopes
34	Lisam-Dilts clays, 5 to 35 percent slopes
35	Lisam-Dilts-Rock outcrop complex, 9 to 35 percent slopes
36	Lonna silt loam, 1 to 3 percent slopes
37	Lonna-Marias complex, 1 to 3 percent slopes
38	Marias clay, 1 to 9 percent slopes
39	Marmarth-Cabbart loams, 5 to 25 percent slopes
40	Martinsdale loam, 1 to 5 percent slopes
41	Martinsdale-Judith loams, 1 to 5 percent slopes
42	Nishon loam
43	Nobe clay
44	Nobe-Absher complex, 0 to 3 percent slopes
45	Parshall sandy loam, 1 to 5 percent slopes
46	Phillips loam, 0 to 5 percent slopes
47	Phillips-Elloam complex, 1 to 9 percent slopes
48	Phillips-Nobe-Absher complex, 1 to 5 percent slopes
49	Phillips-Scobey complex, 2 to 9 percent slopes
50	Phillips-Telstad loams, 2 to 9 percent slopes
51	Phillips-Thoeny loams, 0 to 2 percent slopes
52	Redvale loam, 0 to 3 percent slopes
53	Reeder-Cambert-Doney complex, 2 to 9 percent slopes
54	Reeder-Doney-Cambert complex, 9 to 35 percent slopes
55	Rock outcrop
56	Savage clay loam, 0 to 3 percent slopes
57	Scobey clay loam, 1 to 9 percent slopes
58	Scobey stony clay loams, 2 to 15 percent slopes
59	Scobey-Sunburst clay loams, 5 to 25 percent slopes
60	Sunburst clay loam, 9 to 35 percent slopes
61	Sunburst-Lisam complex, 9 to 35 percent slopes
62	Tally sandy loam, 2 to 5 percent slopes
63	Tally-Dooley sandy loams, 0 to 5 percent slopes
64	Tally-Dooley sandy loams, 5 to 15 percent slopes
65	Telstad loam, 1 to 9 percent slopes
66	Thebo clay, 2 to 9 percent slopes
67	Thebo-Elloam clays, 2 to 9 percent slopes
68	Thebo-Lisam clays, 2 to 15 percent slopes
69	Thoeny-Phillips complex, 1 to 5 percent slopes
70	Tinsley complex, 9 to 35 percent slopes
71	Tinsley-Reeder-Doney complex, 9 to 35 percent slopes
72	Turner loam, 0 to 2 percent slopes
73	Turner and Farnuf loams, wet, 0 to 2 percent slopes
74	Typic Fluvaquents, gently sloping
75	Ustic Torrifluvents, gently sloping
76	Vaeda silty clay
77	Williams loam, 2 to 9 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate (79)
- Federal (410)
- State (52)
- County, farm or ranch (378)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small (water; w)

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (GAS)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
- Double-line (label) (CANAL)
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water; w)
- Intermittent (int; i)

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (16; 50)

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

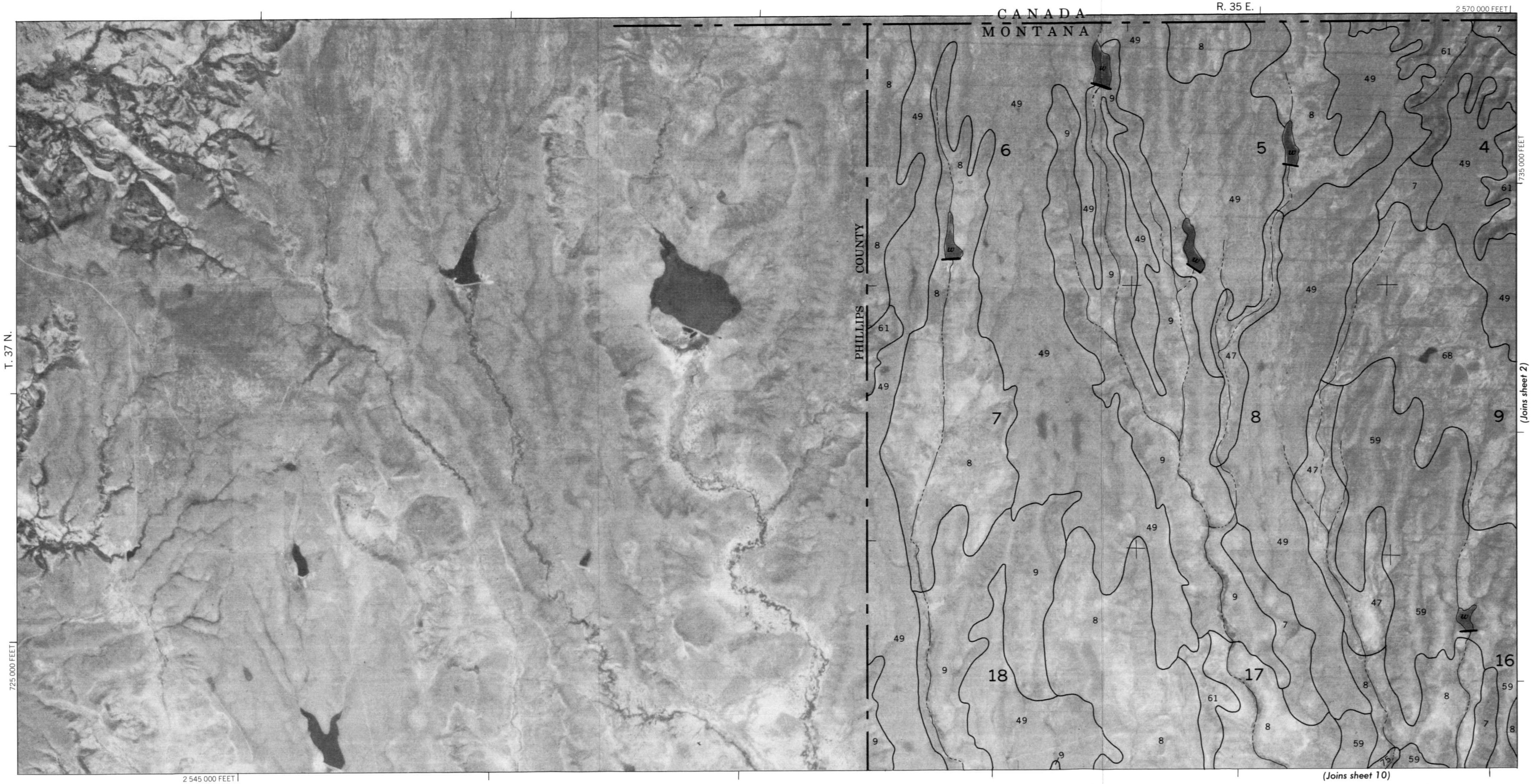
SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

VALLEY COUNTY, MONTANA — SHEET NUMBER 1

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

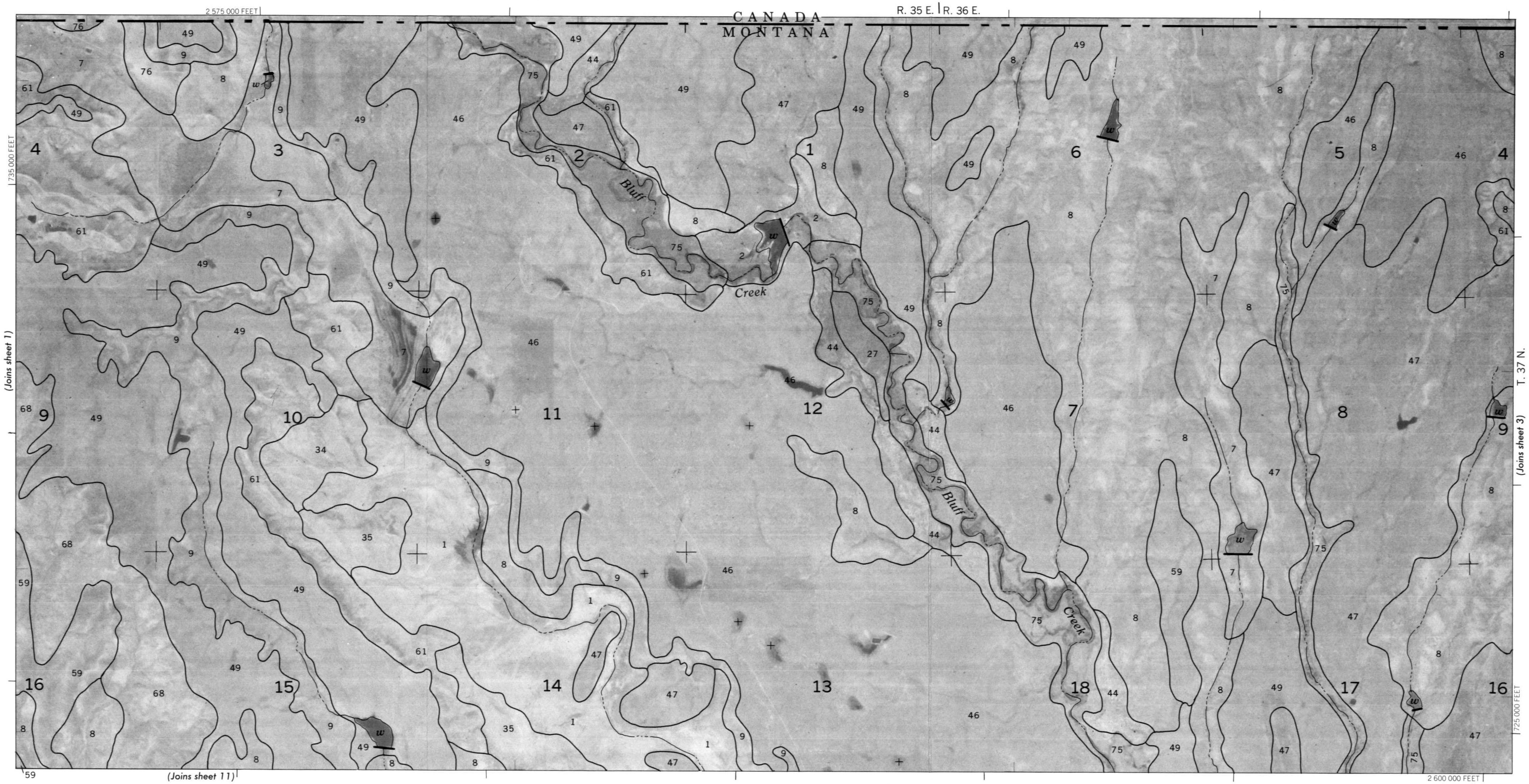
VALLEY COUNTY, MONTANA NO. 1

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 2



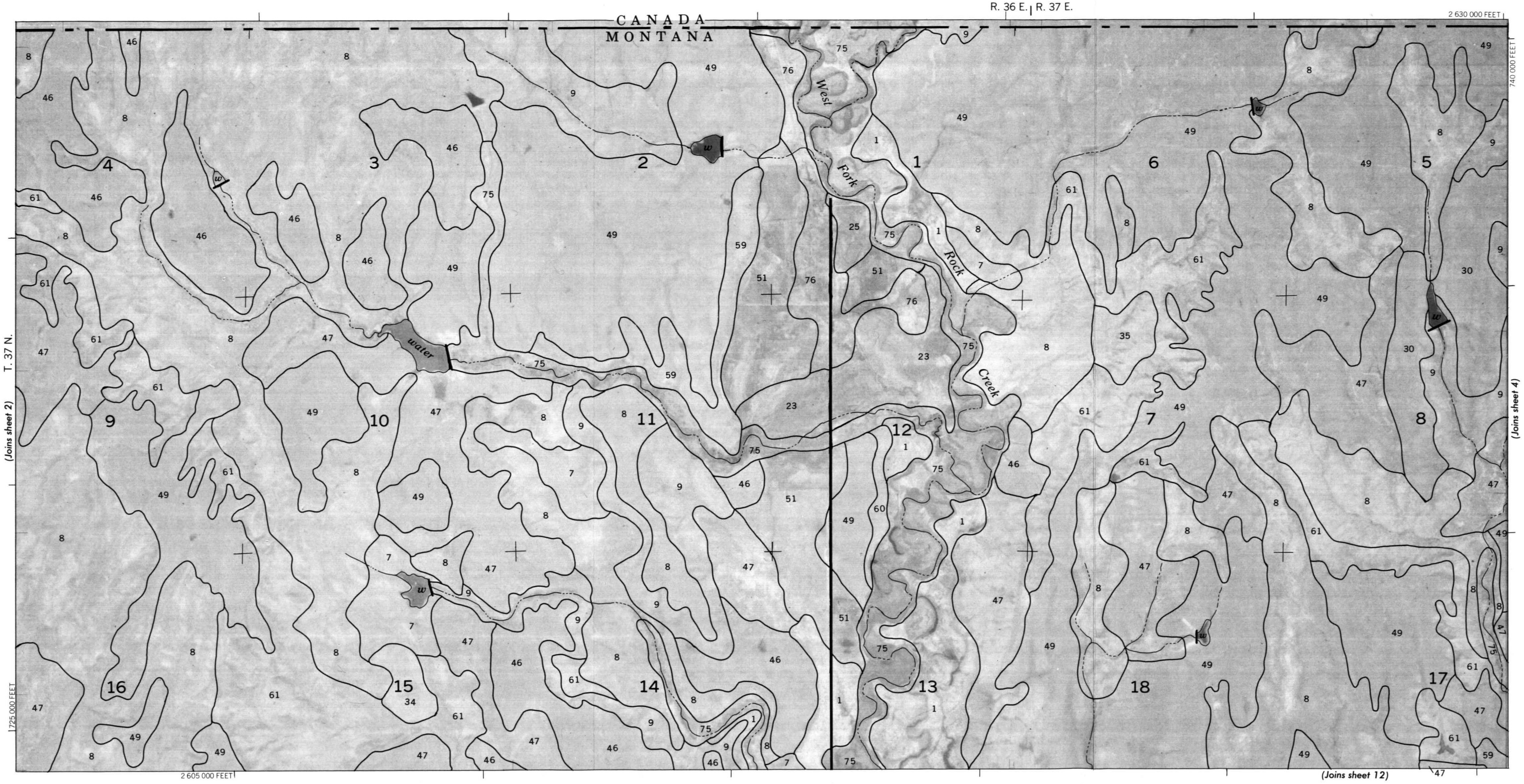
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

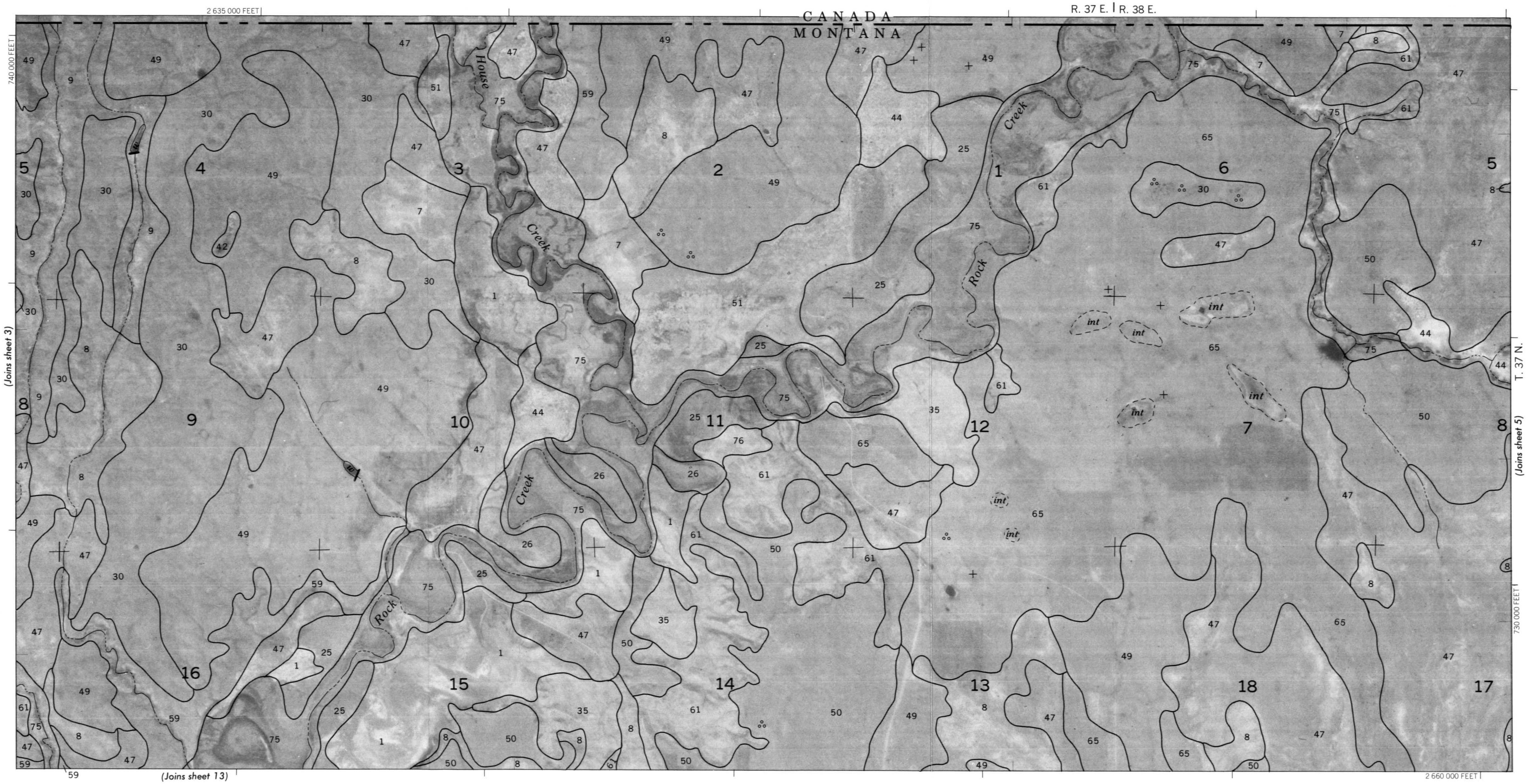
VALLEY COUNTY, MONTANA NO. 3

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

4

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 4



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

Scale 1:24 000

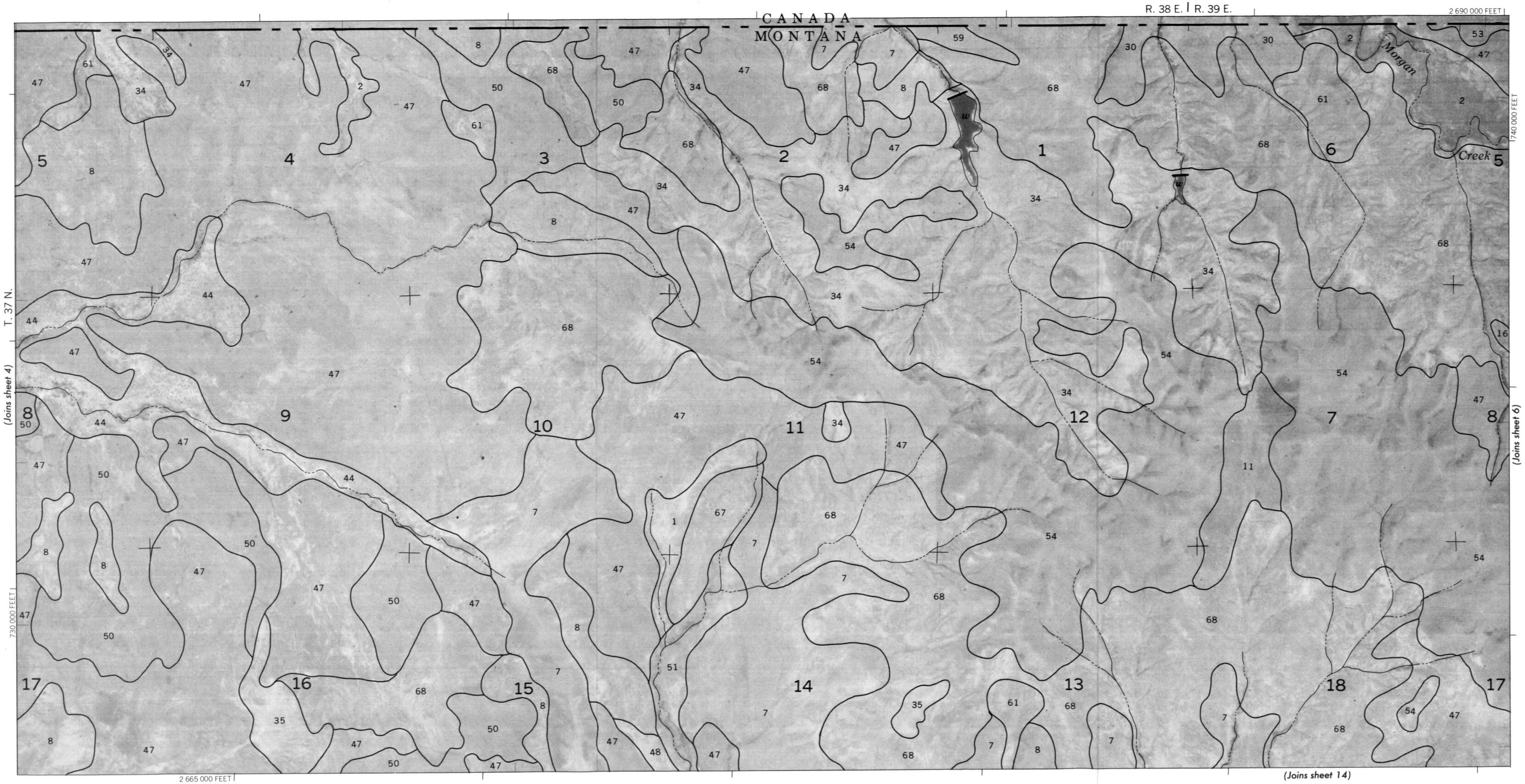
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 4

5

N



1 ¾ ½ ¼ 0 1 2 Miles

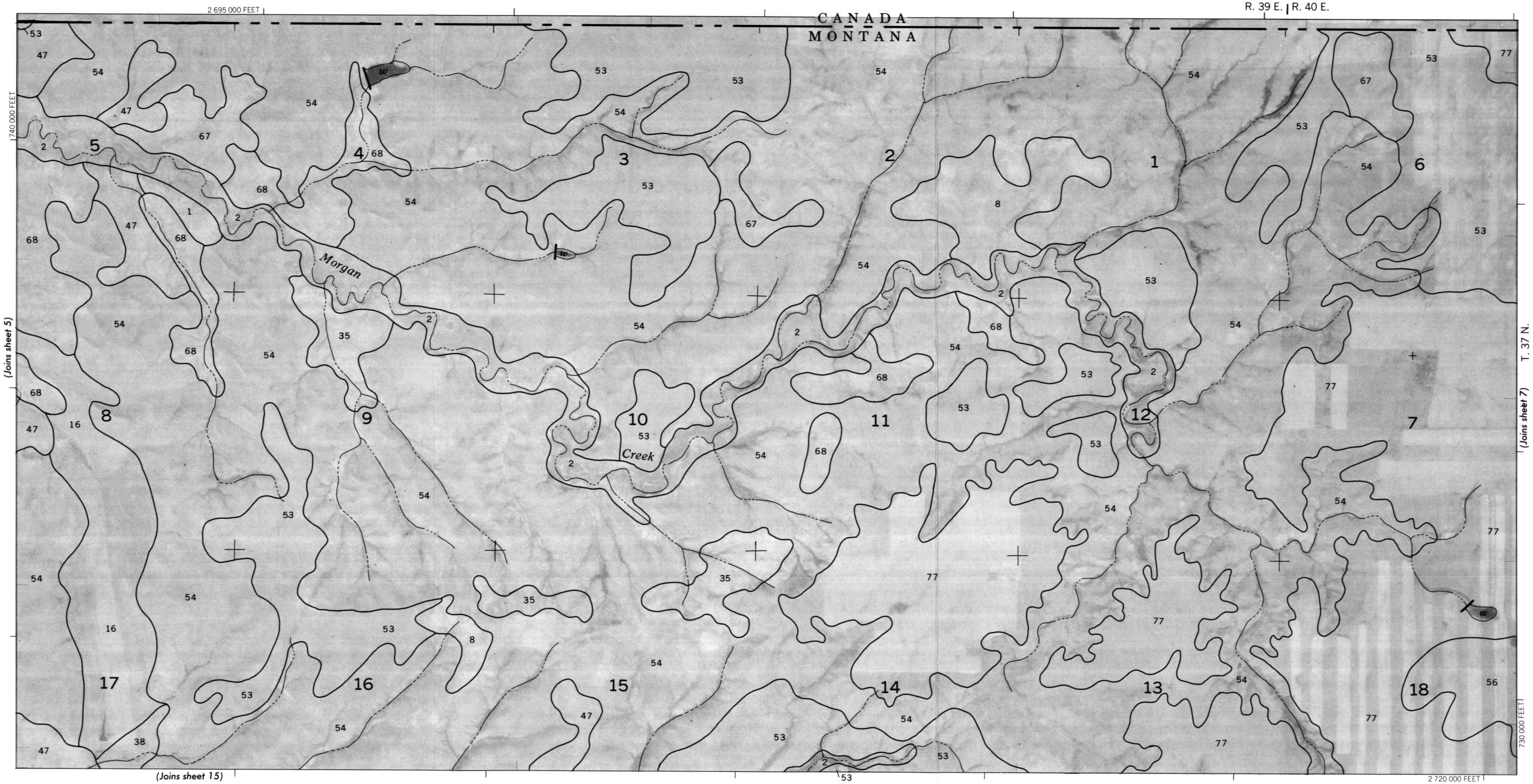
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map was compiled on 1974, 1975, and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 6



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 6

7

N

VALLEY COUNTY, MONTANA NO. 7

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 8

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

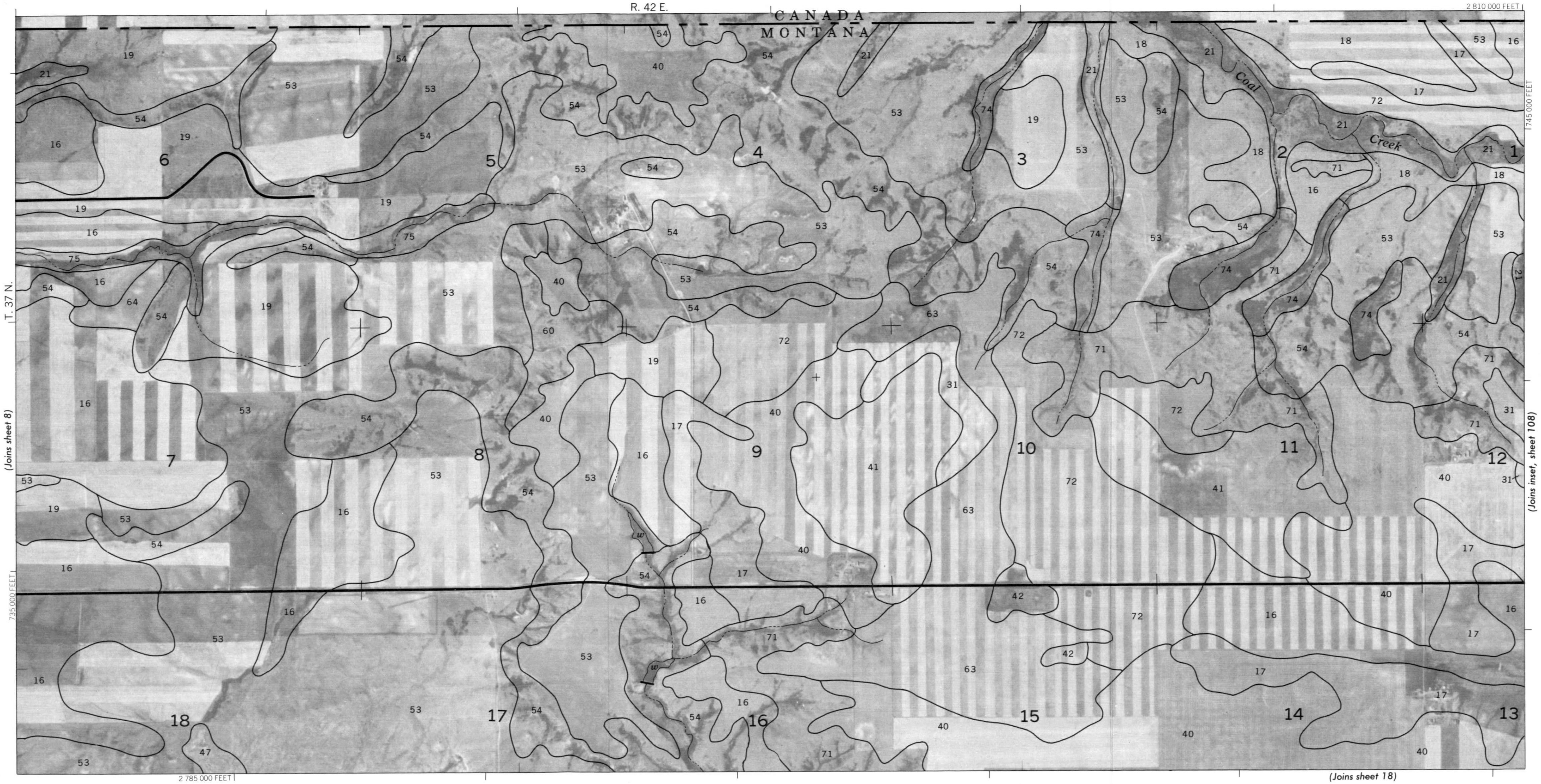
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

9

N

VALLEY COUNTY, MONTANA NO. 9

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

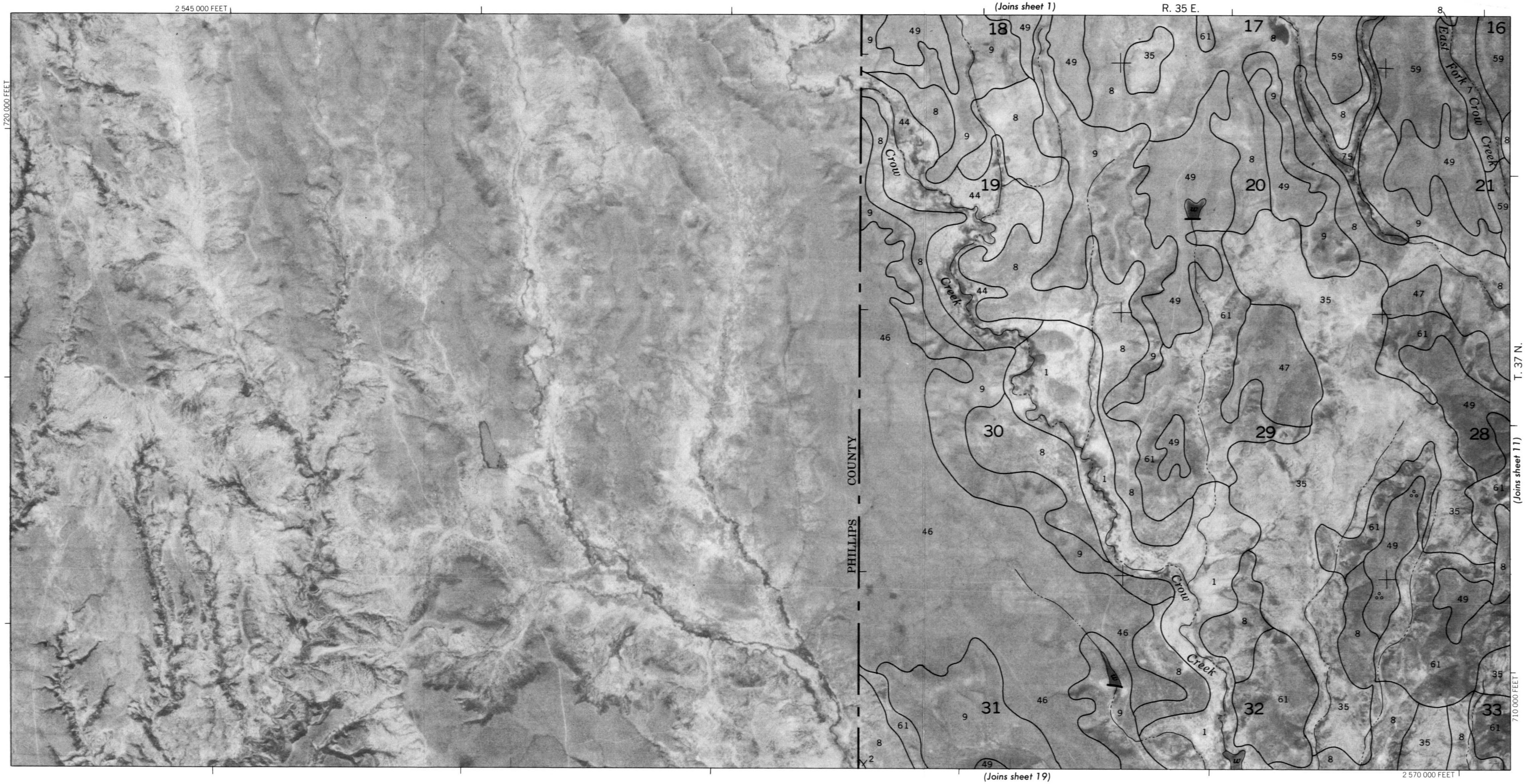
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

10

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 10



Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

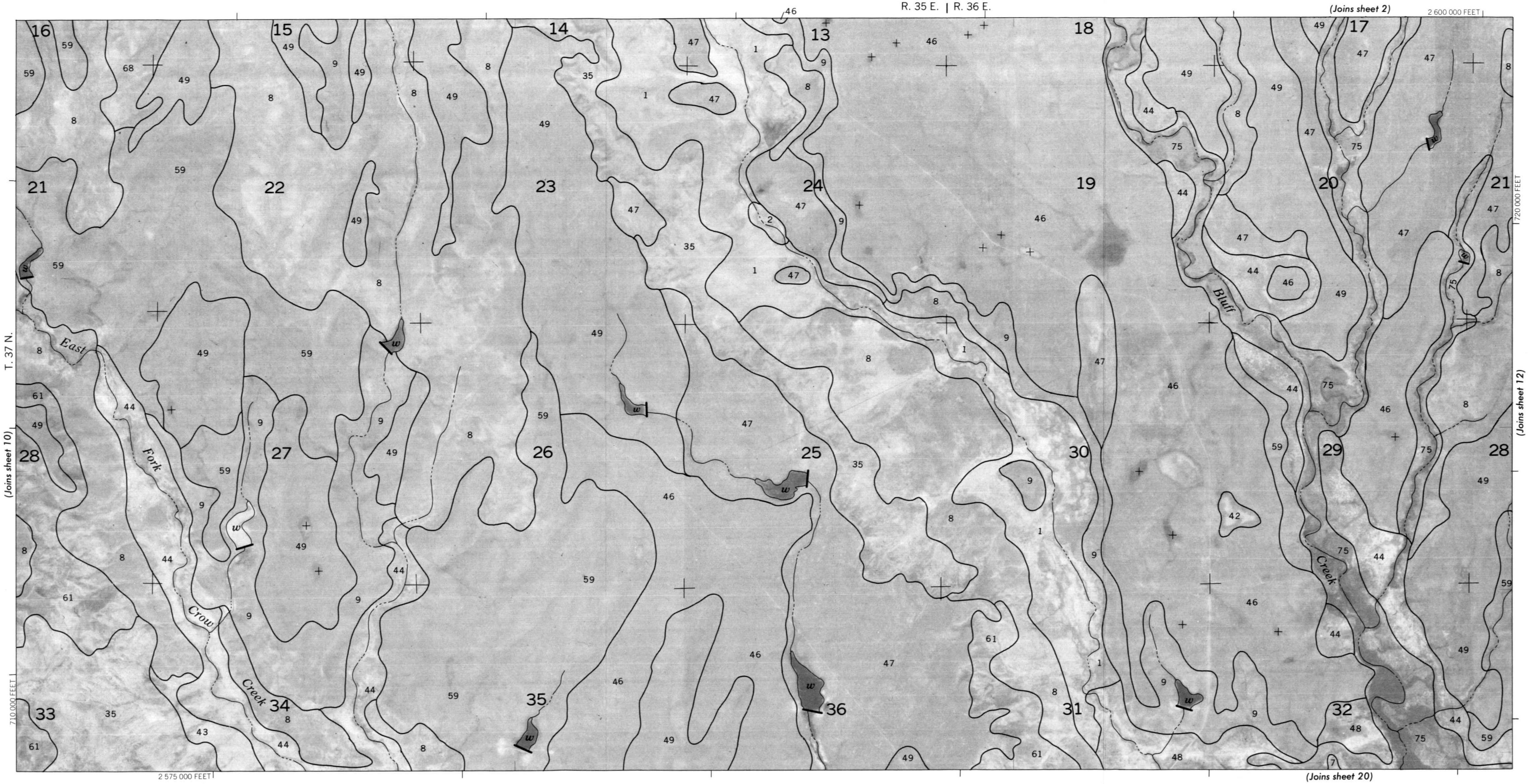
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 10

11

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

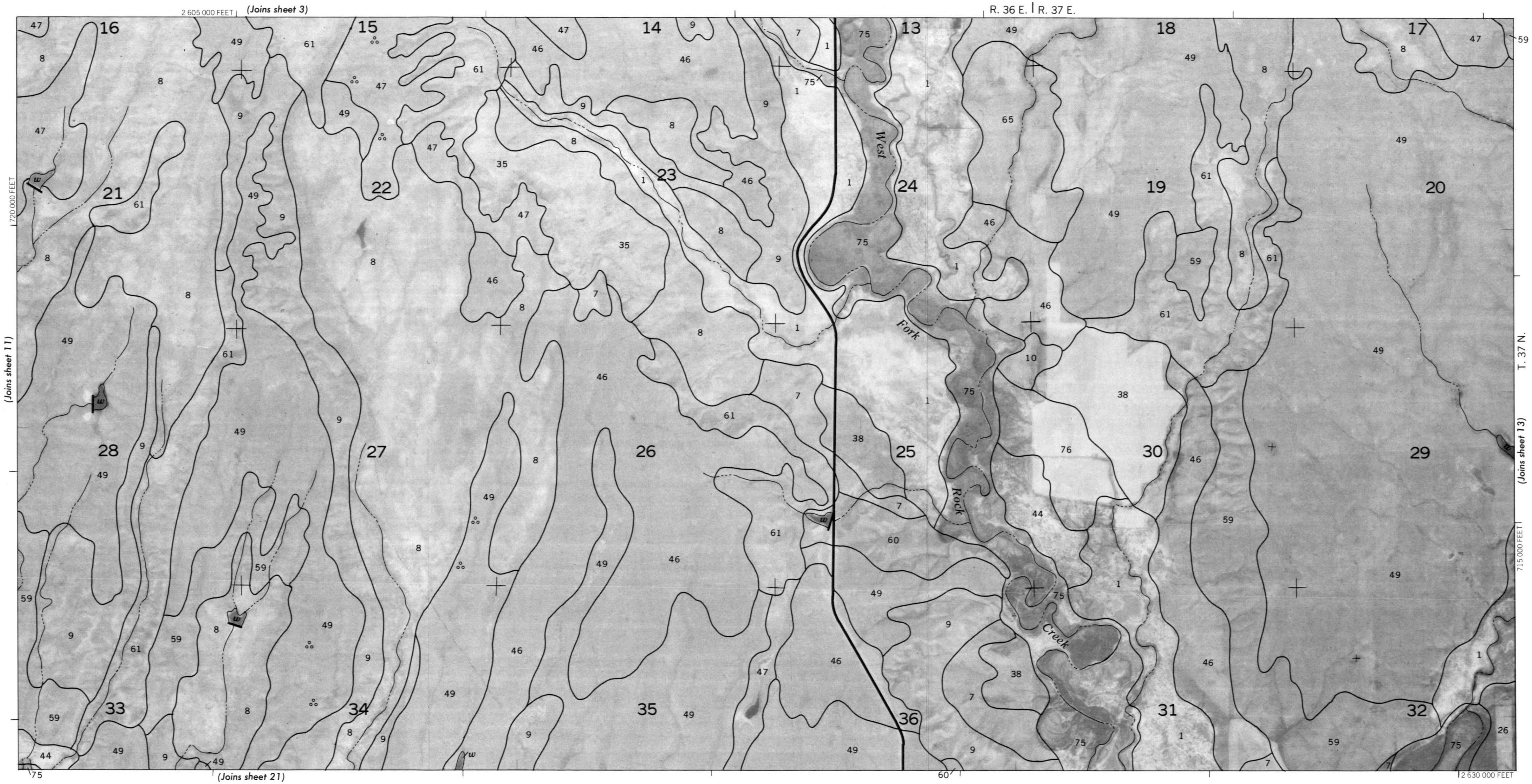
VALLEY COUNTY, MONTANA NO. 11

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 12

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

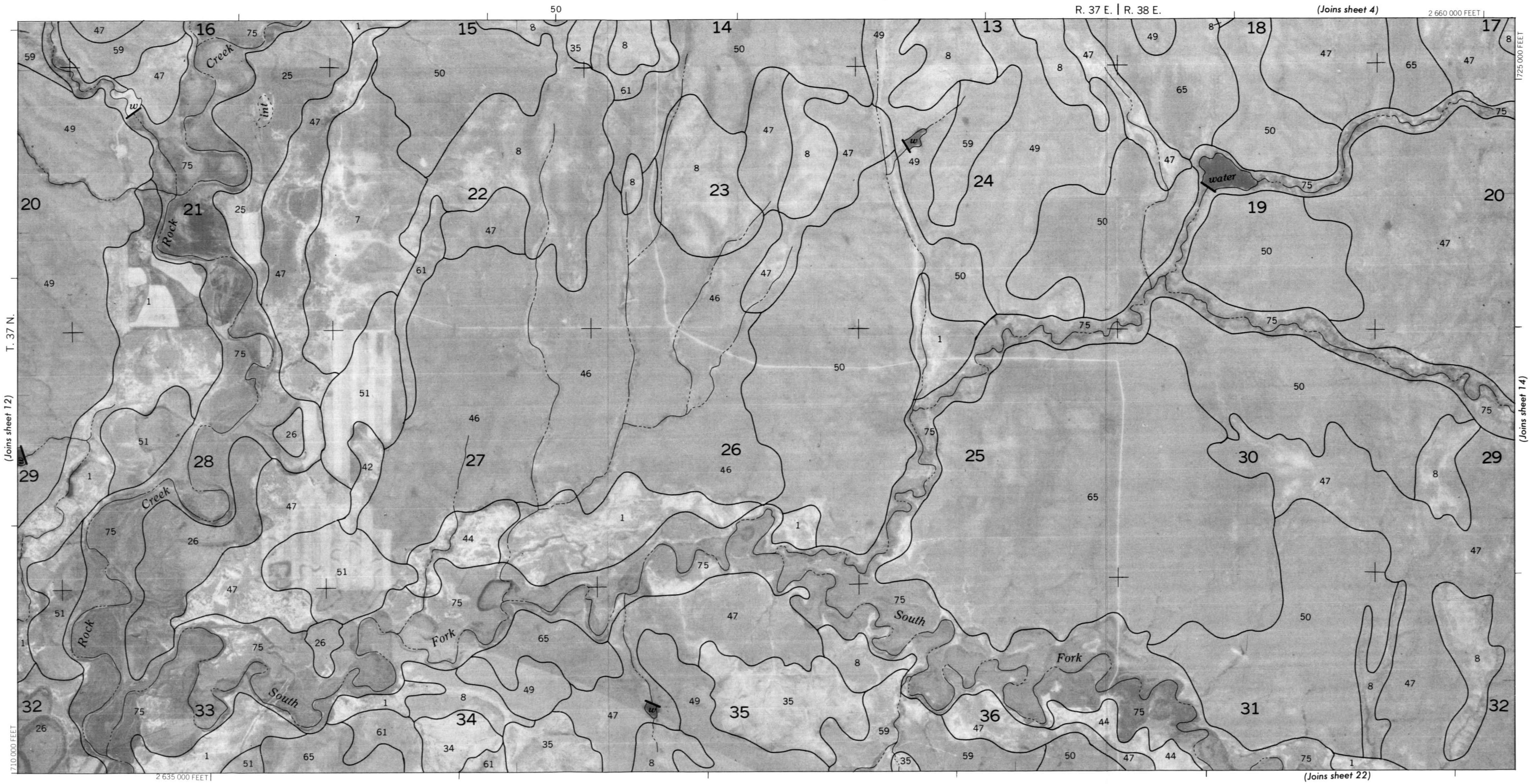
Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

13

N



VALLEY COUNTY, MONTANA NO. 13

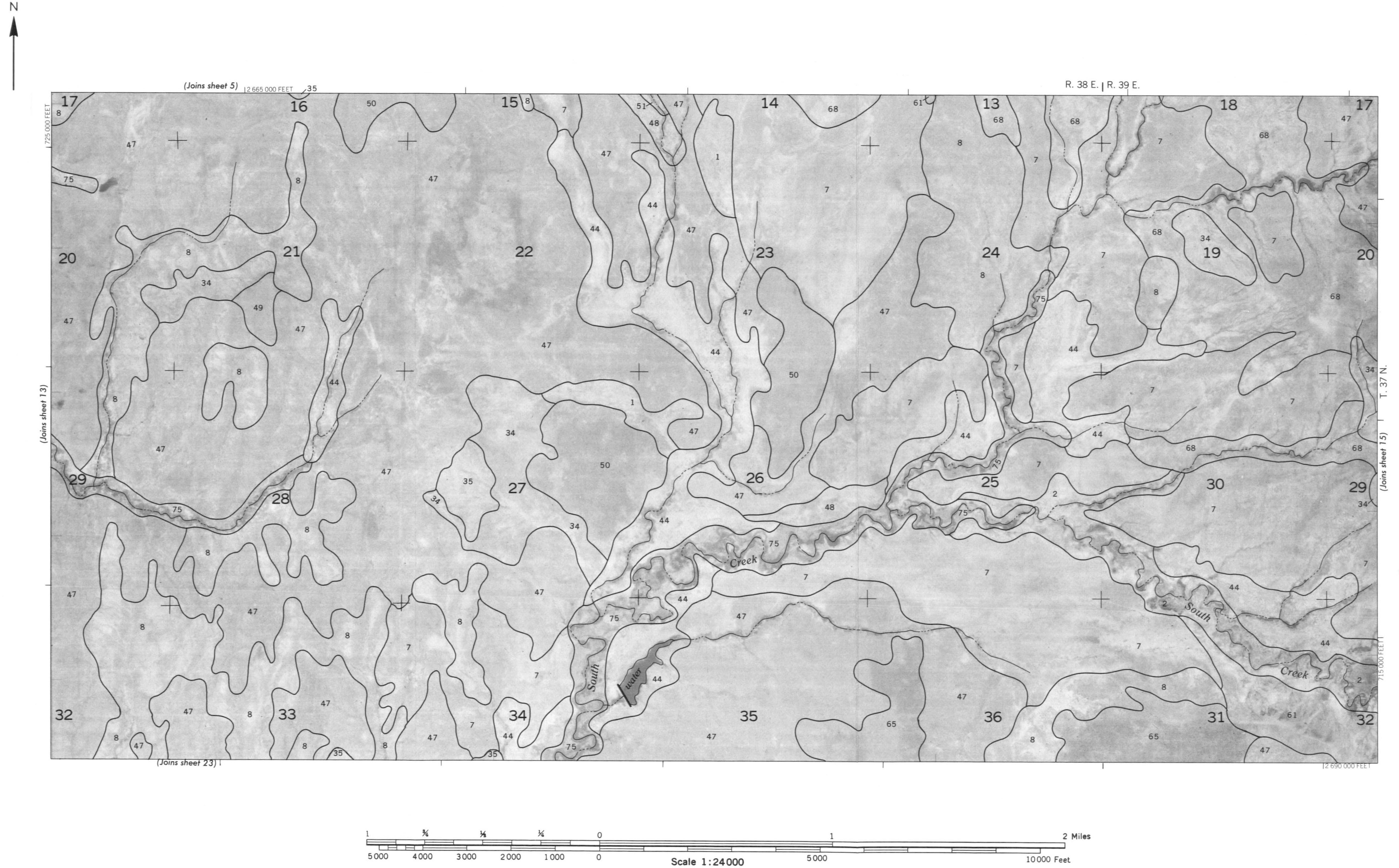
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5 000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

Scale 1:24 000

VALLEY COUNTY, MONTANA — SHEET NUMBER 14



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

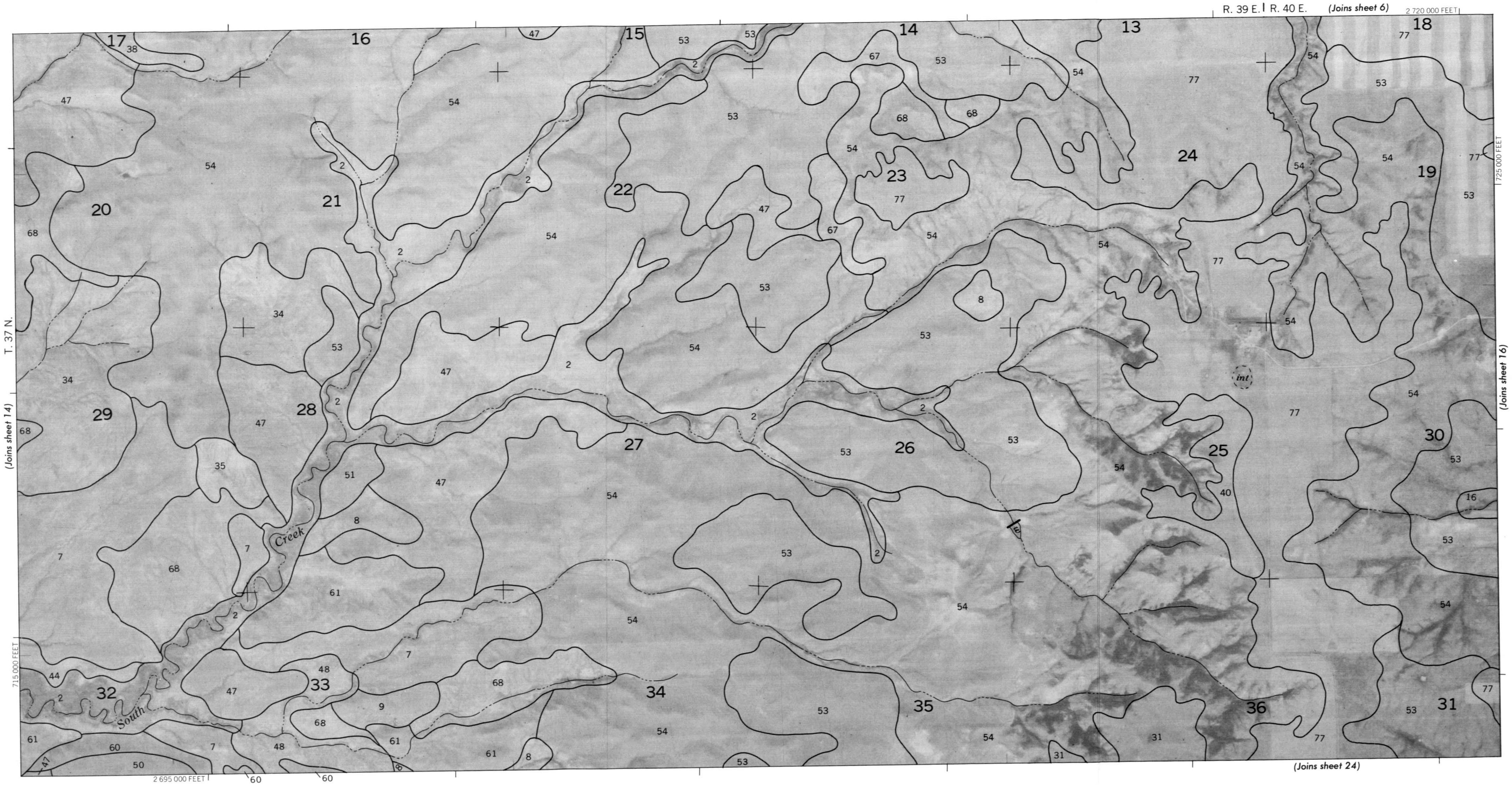
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

15

N

VALLEY COUNTY, MONTANA NO. 15

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



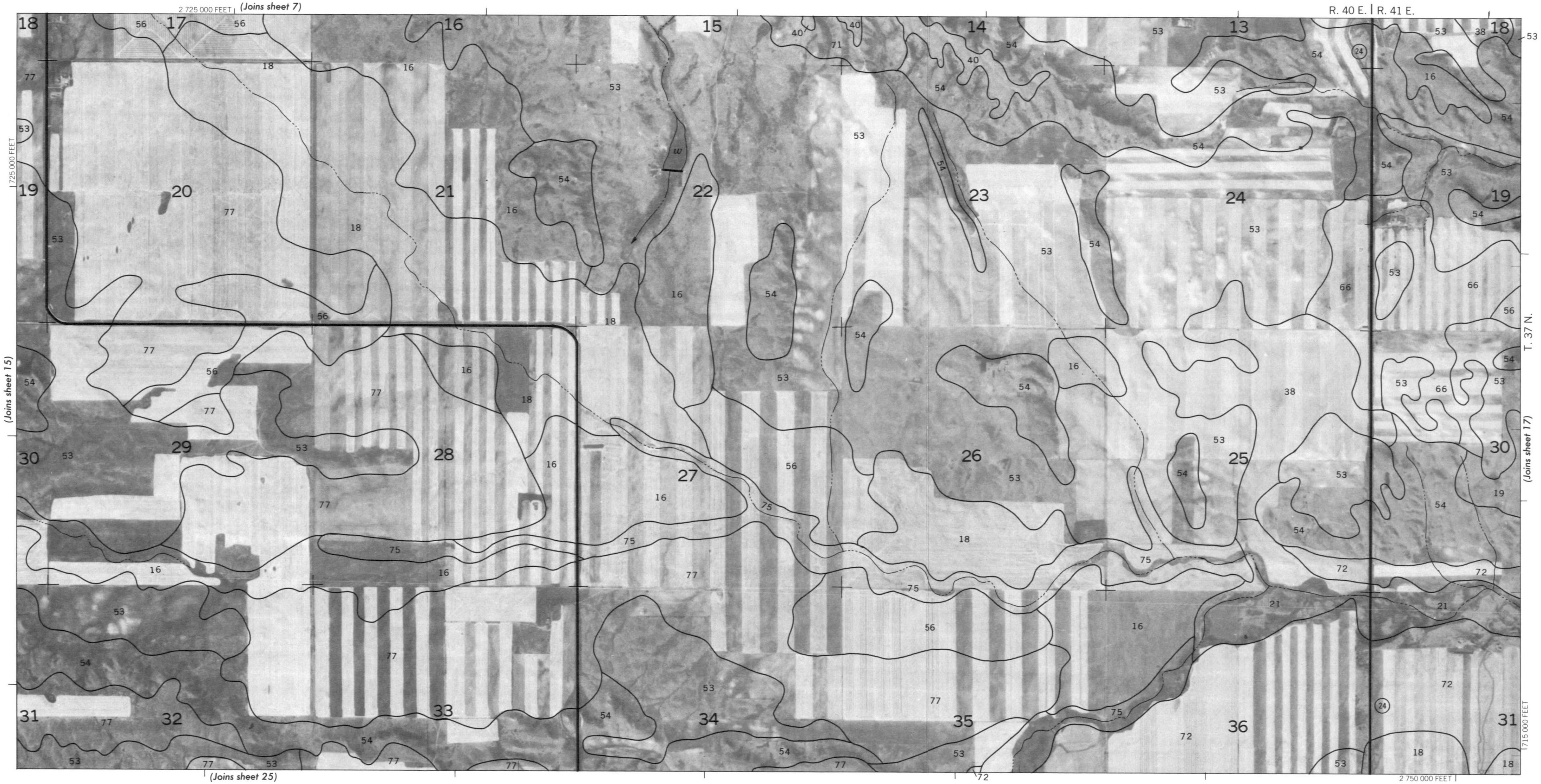
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 16



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

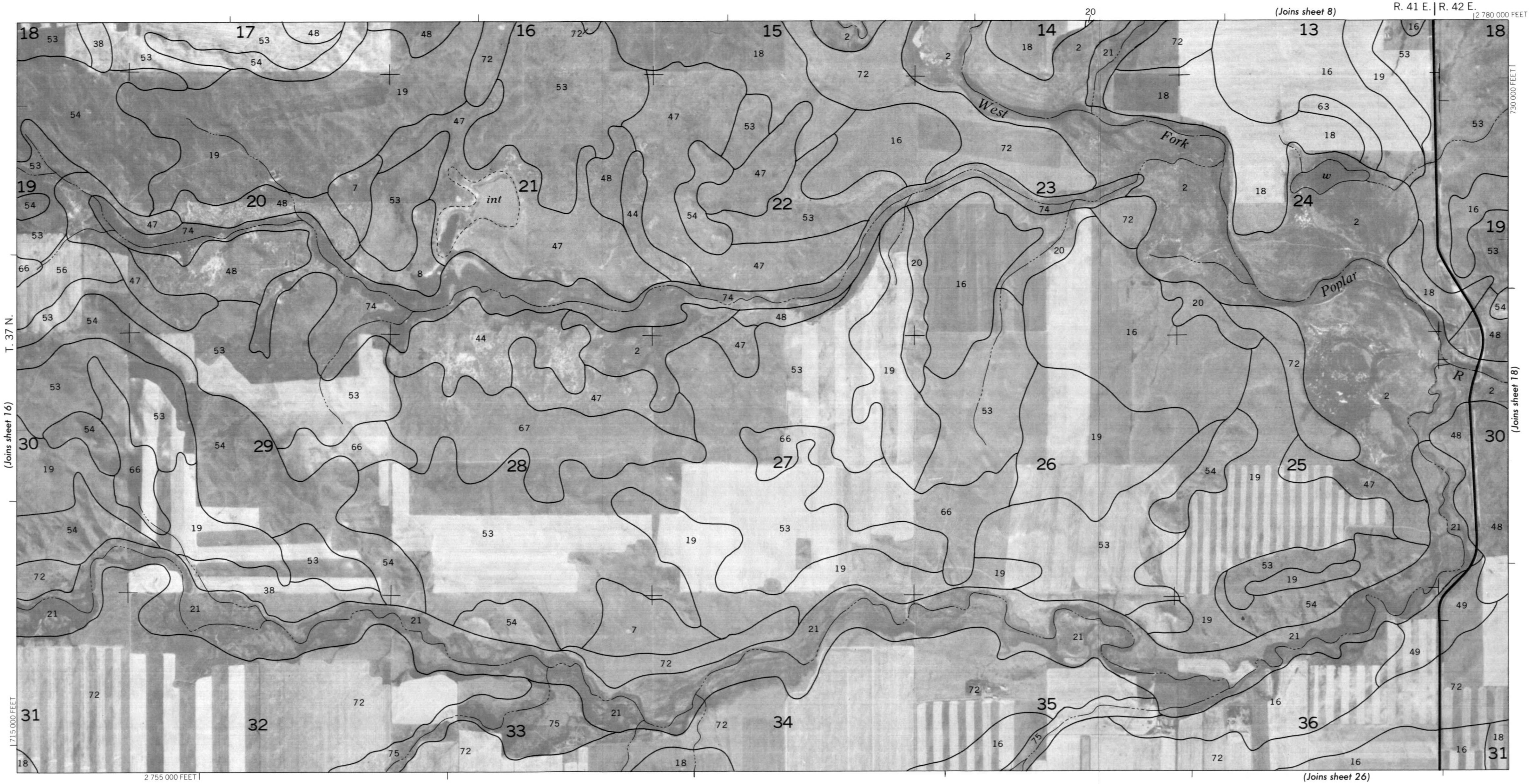
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 16

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

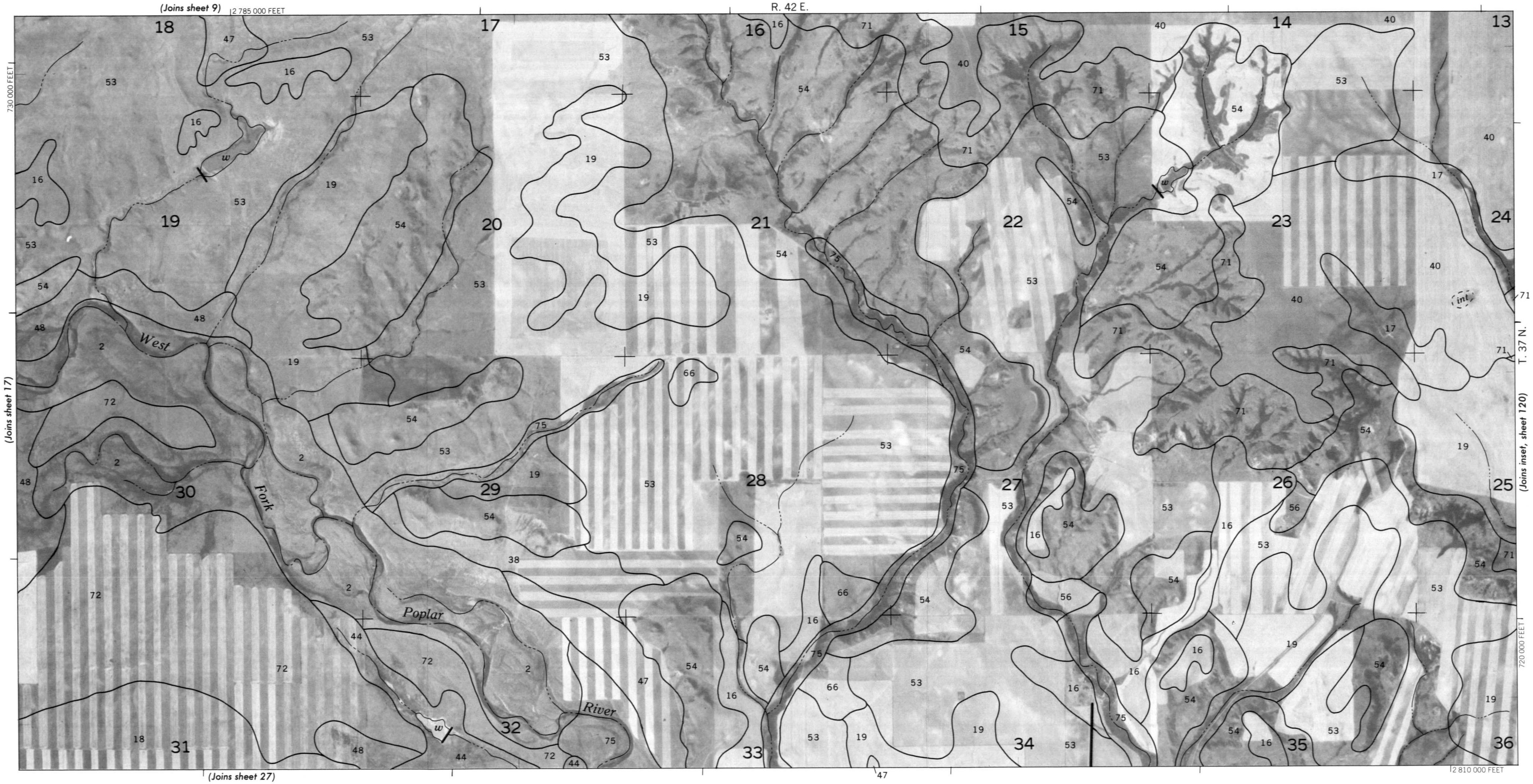
VALLEY COUNTY, MONTANA NO. 17

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

18

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 18



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

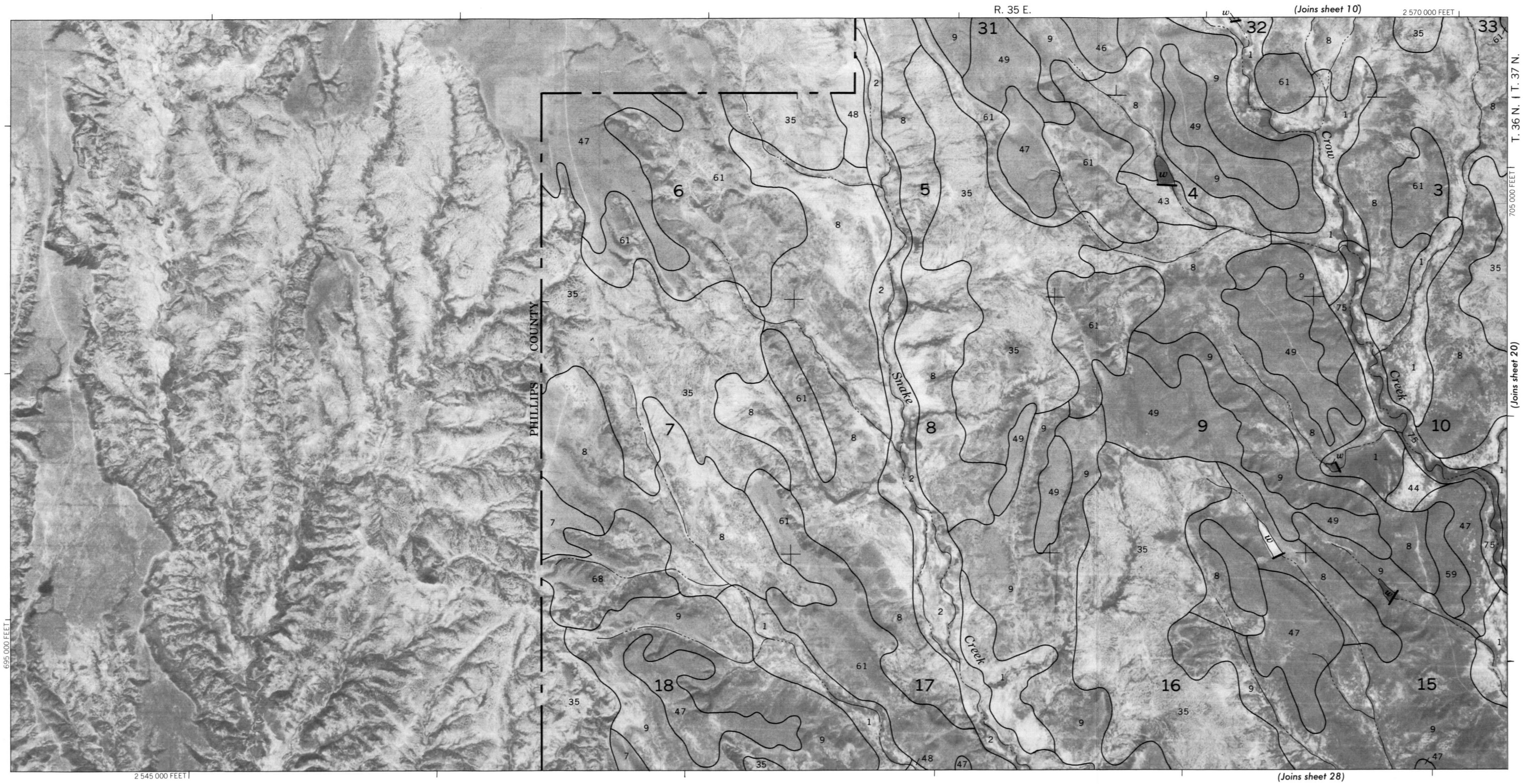
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

19

N



1 ¾ ½ ¼ 0 1 2 Miles

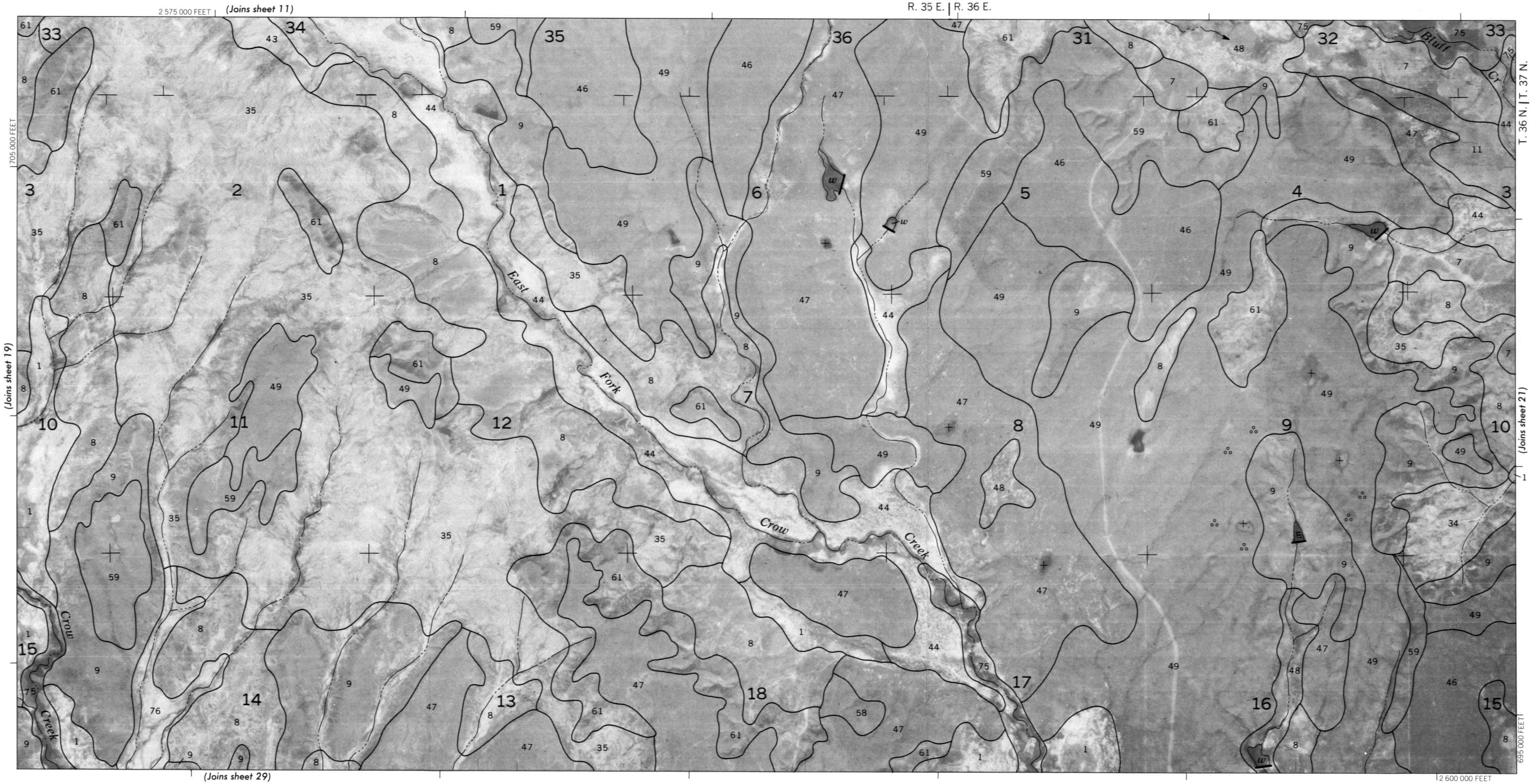
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 20



1 ¾ ½ ¼ 0 1 2 Miles

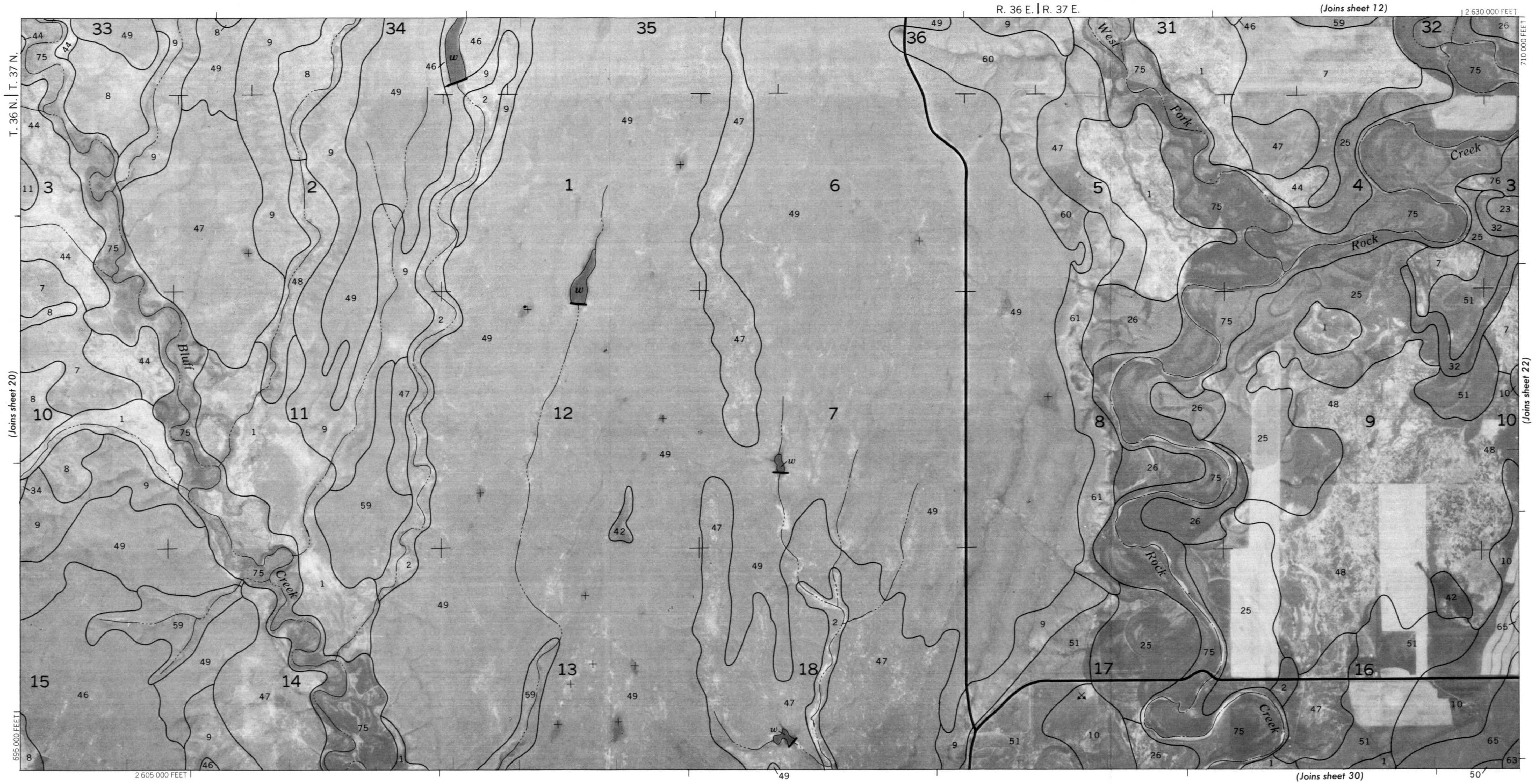
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

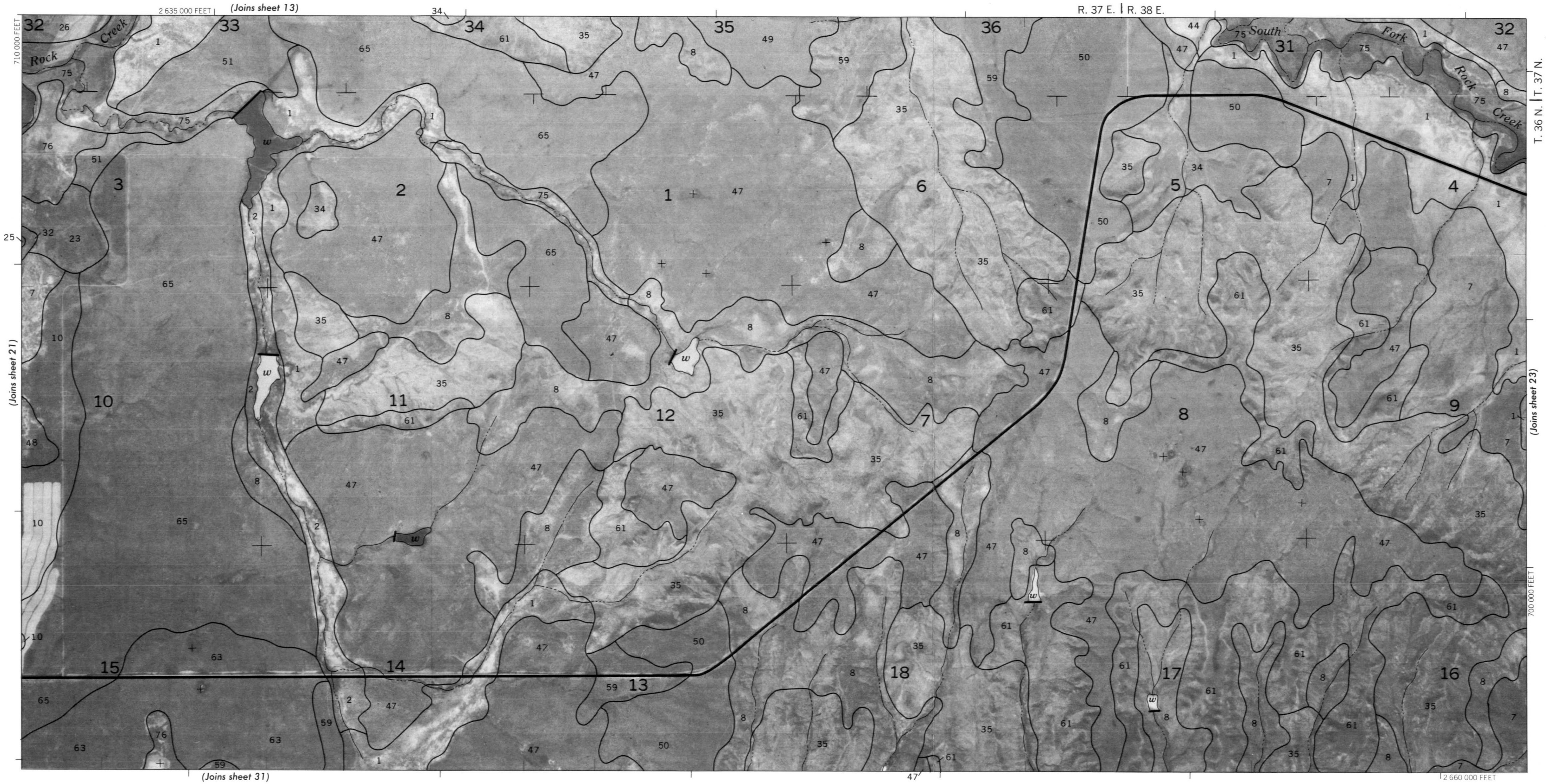
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 21

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 22



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

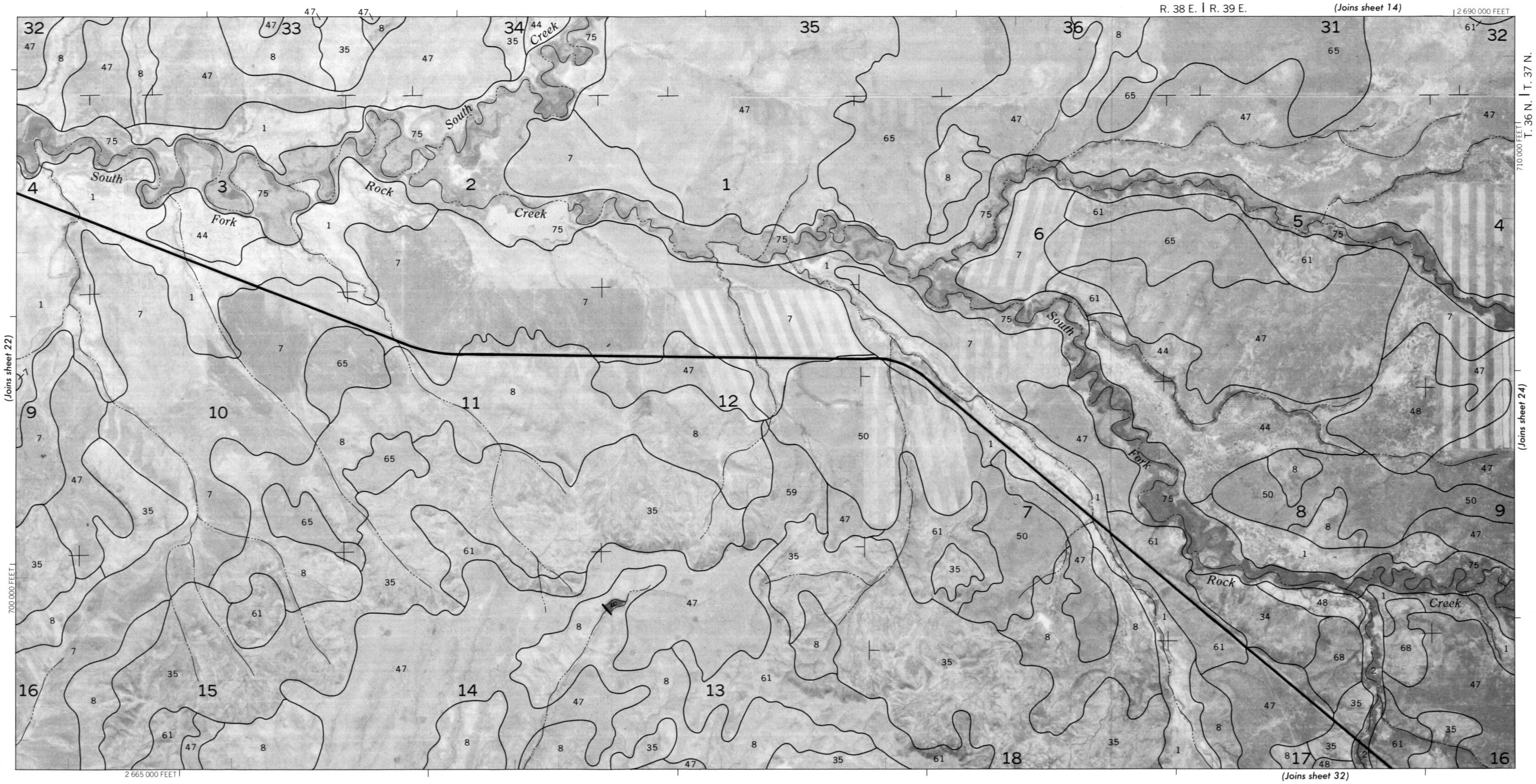
Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

23

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

Scale 1:24 000

VALLEY COUNTY, MONTANA NO. 23

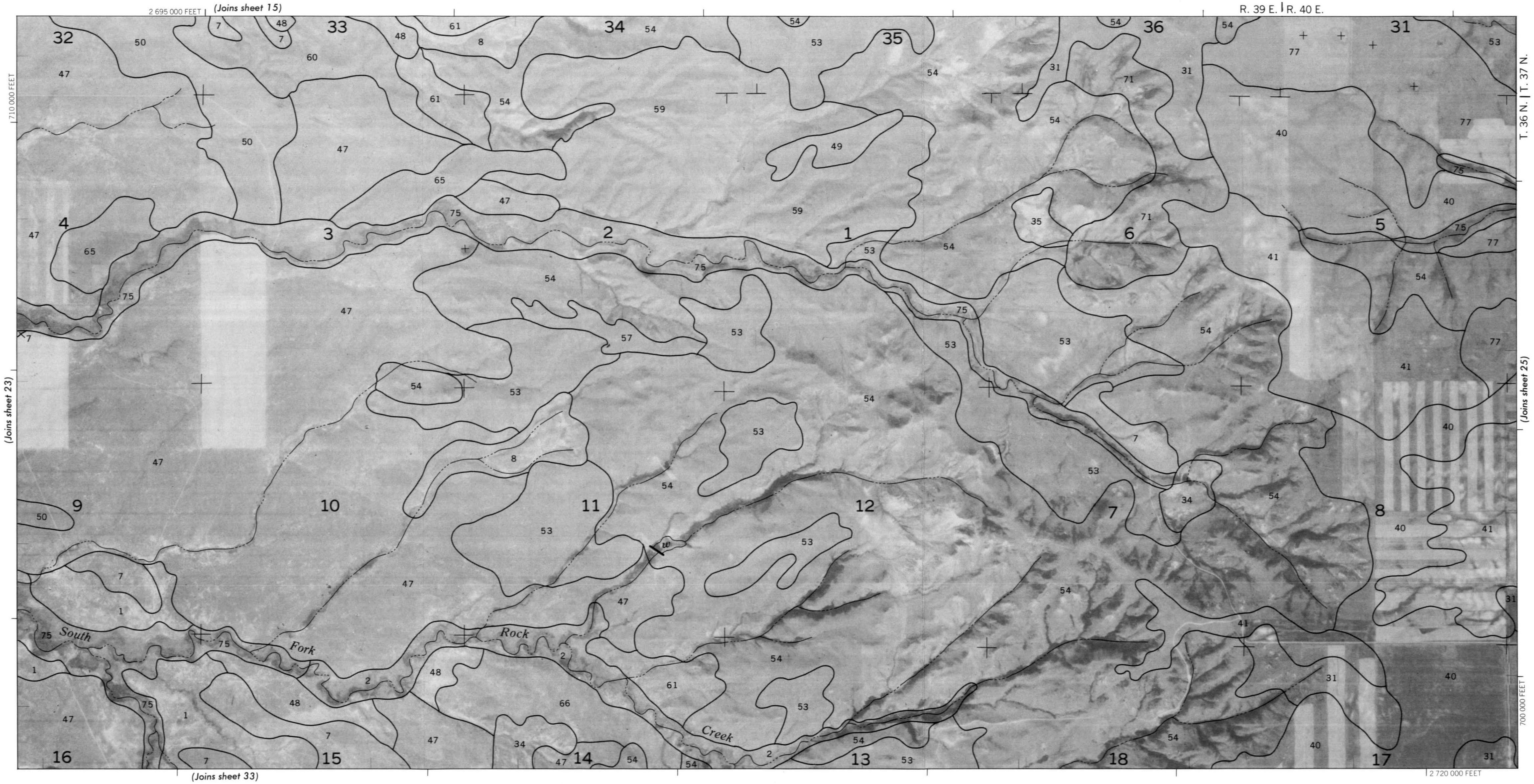
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5 000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

24

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 24

(Joins sheet 15)



(Joins sheet 33)

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

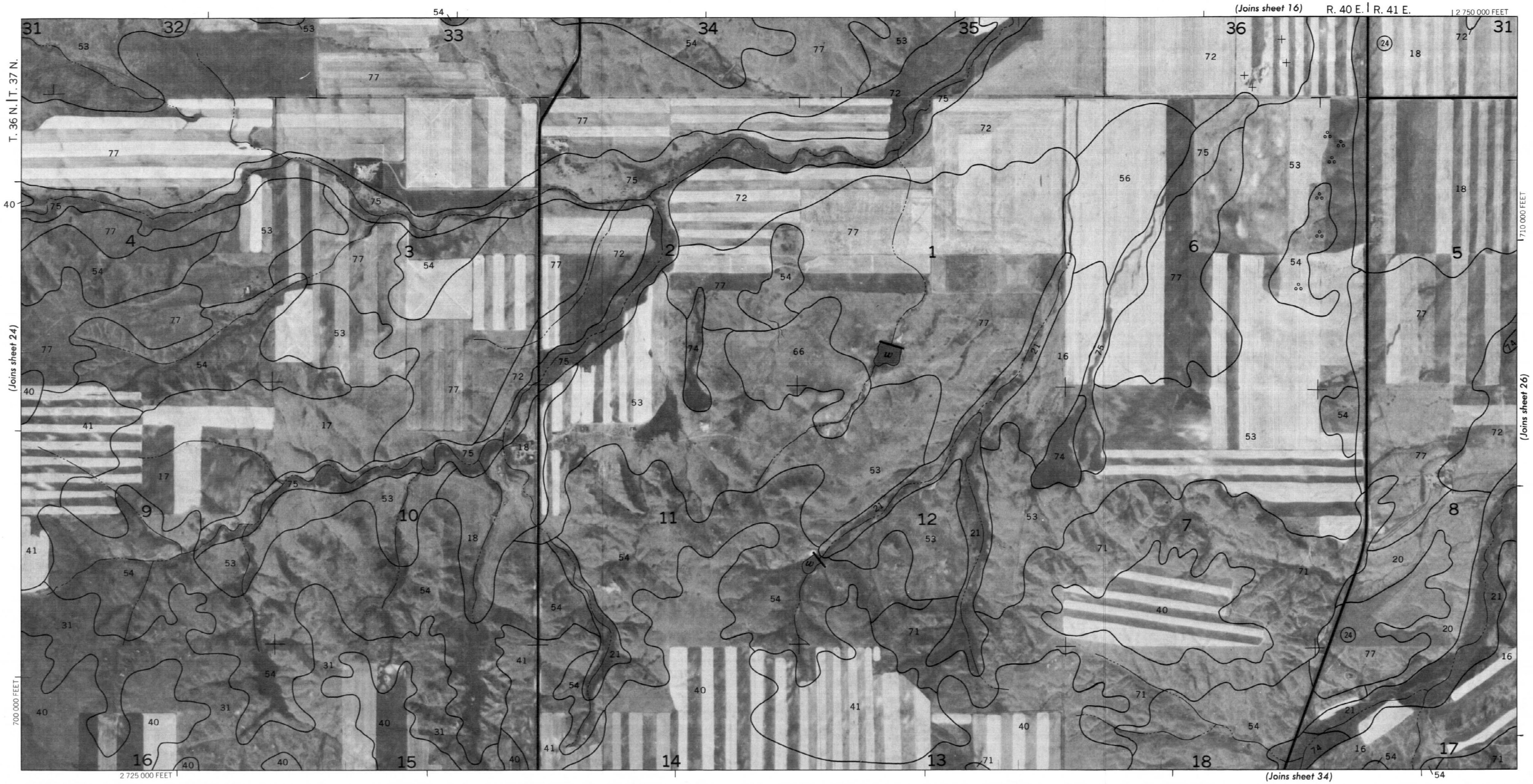
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 24

N

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

26

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 26

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

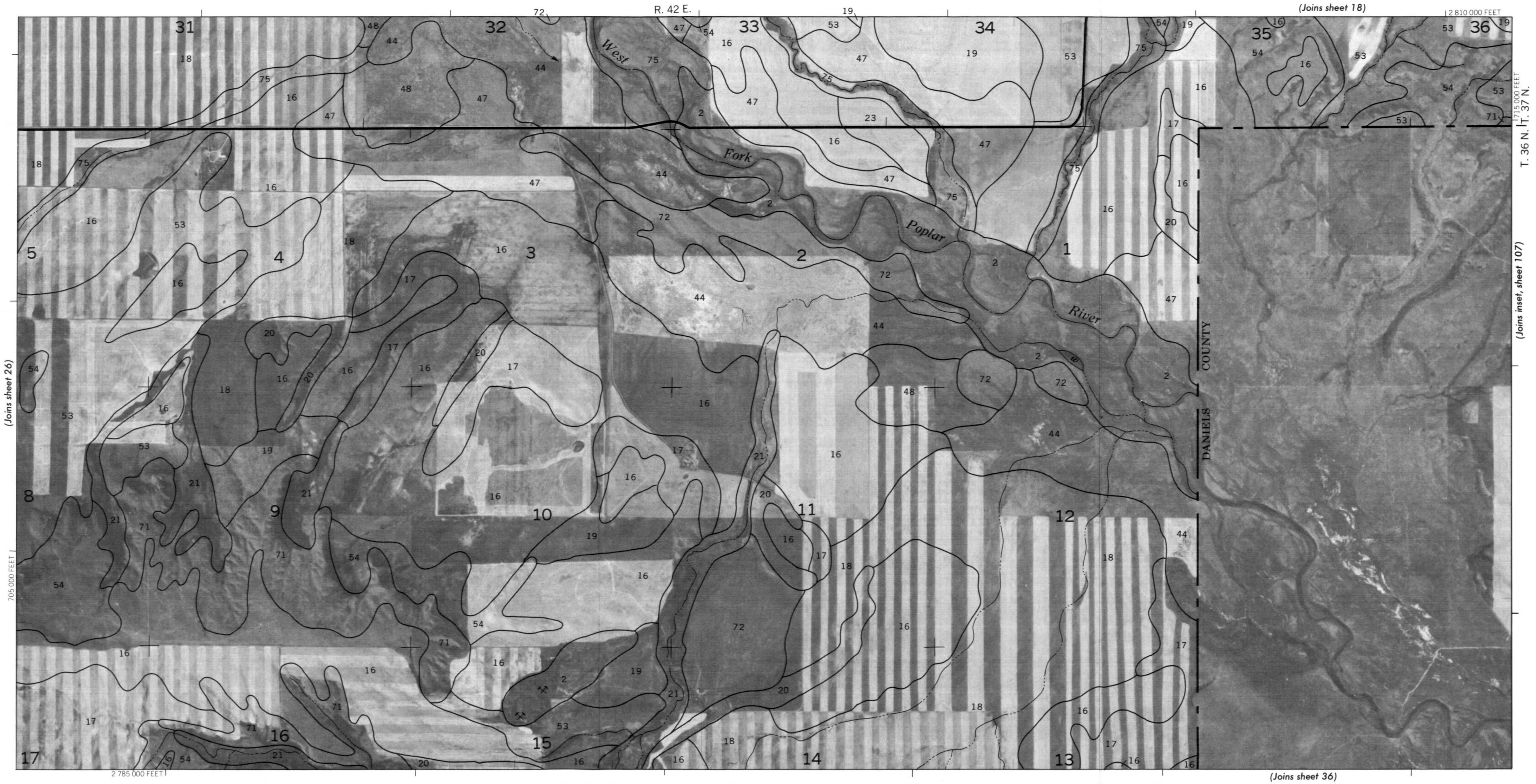
VALLEY COUNTY, MONTANA NO. 26

VALLEY COUNTY, MONTANA — SHEET NUMBER 27

VALLEY COUNTY, MONTANA NO. 27

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N



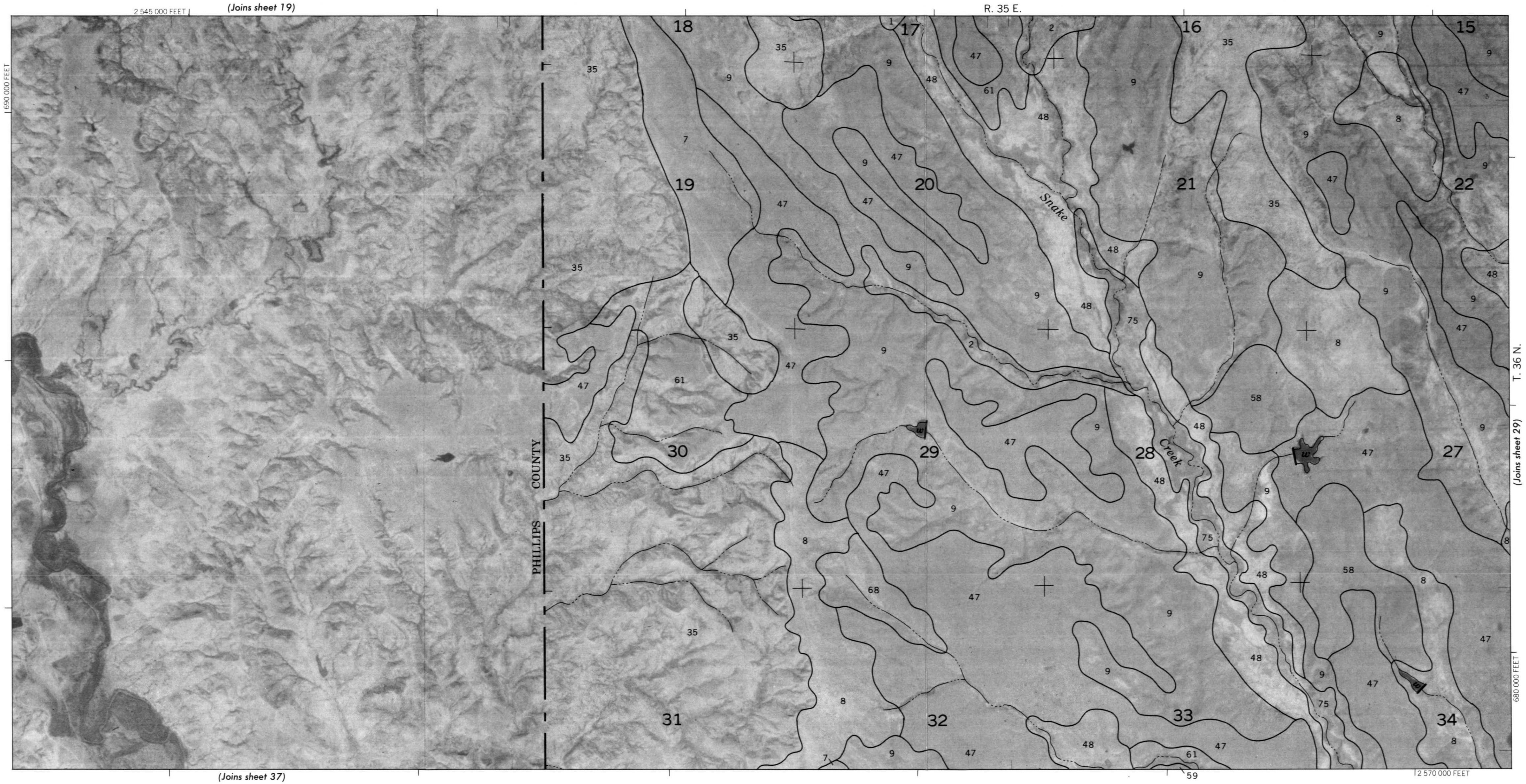
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

28

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

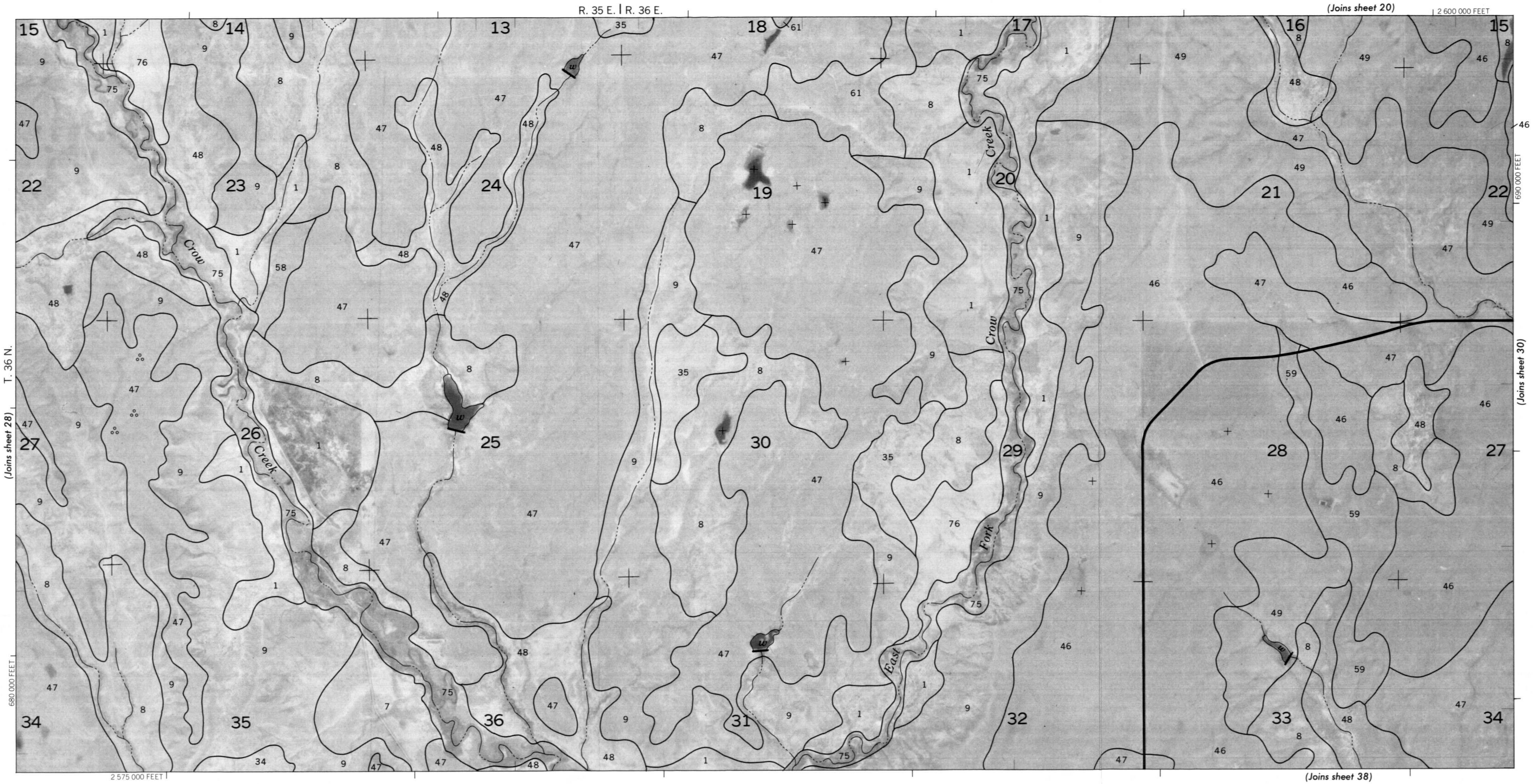
Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 28

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

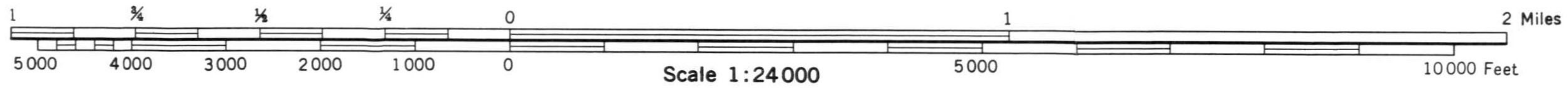
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 29

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 30



5 000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

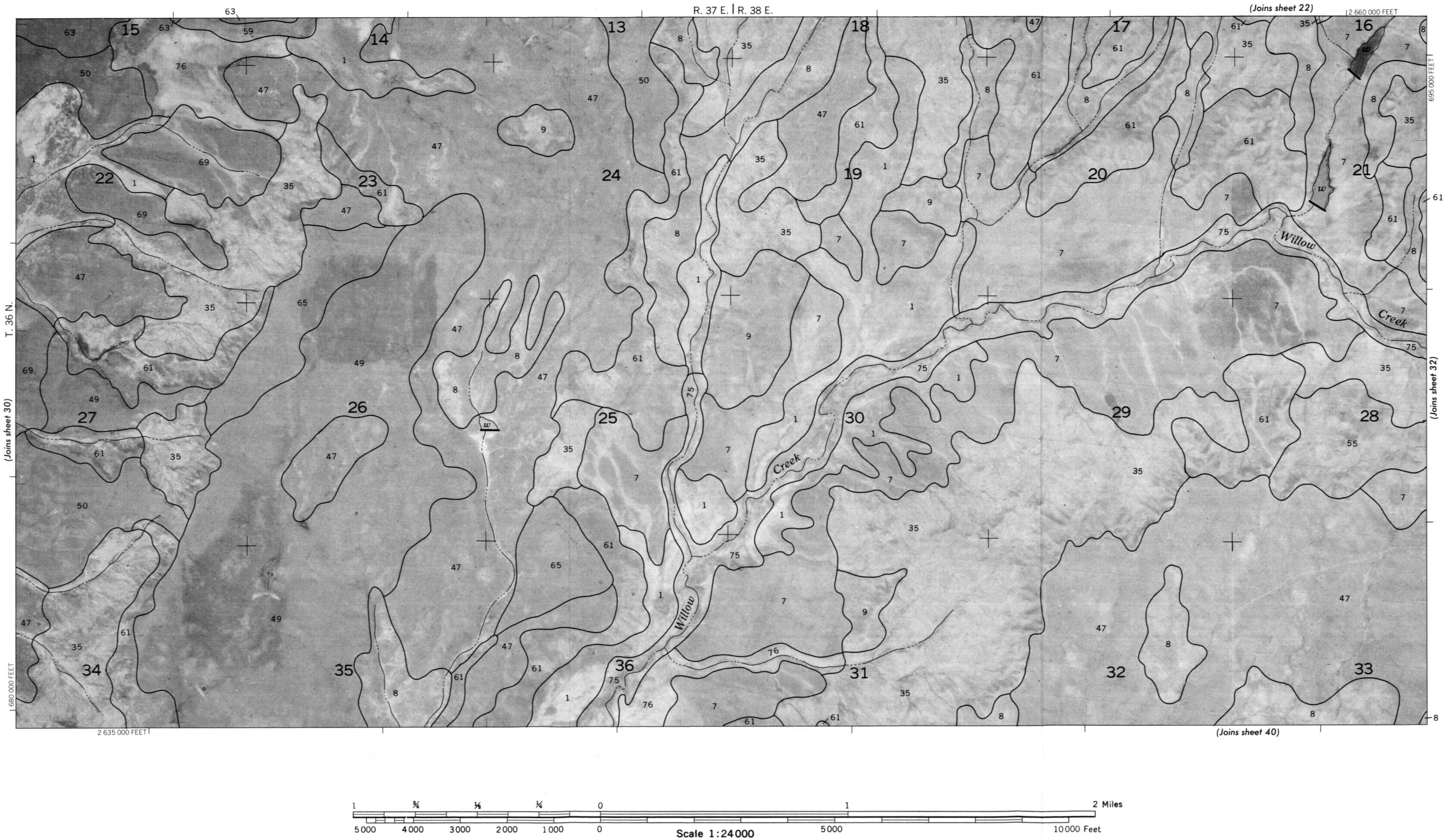
VALLEY COUNTY, MONTANA NO. 30

31

N

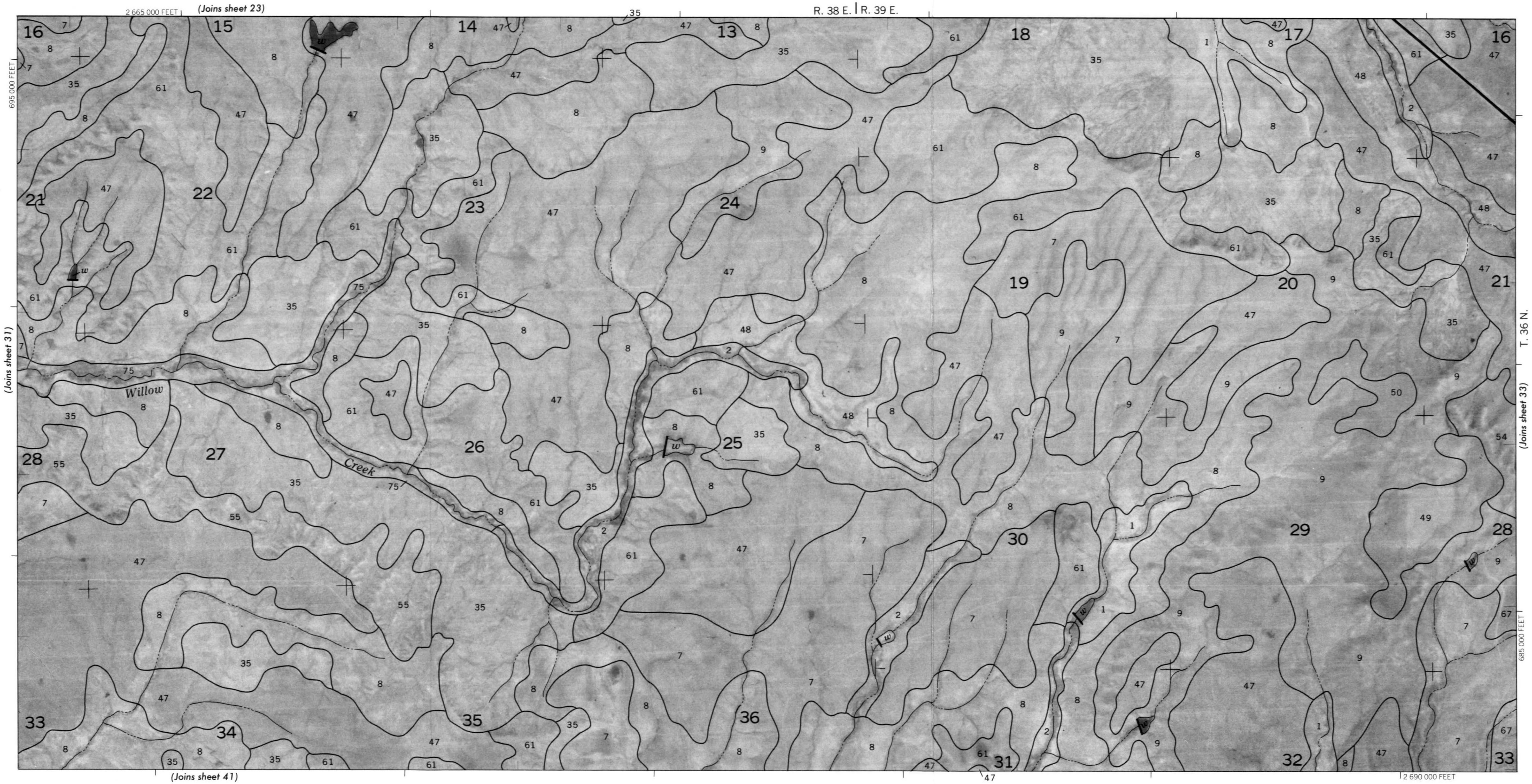
VALLEY COUNTY, MONTANA NO. 31

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



VALLEY COUNTY, MONTANA — SHEET NUMBER 32

N



1 ¾ ½ ¼ 0 1 2 Miles

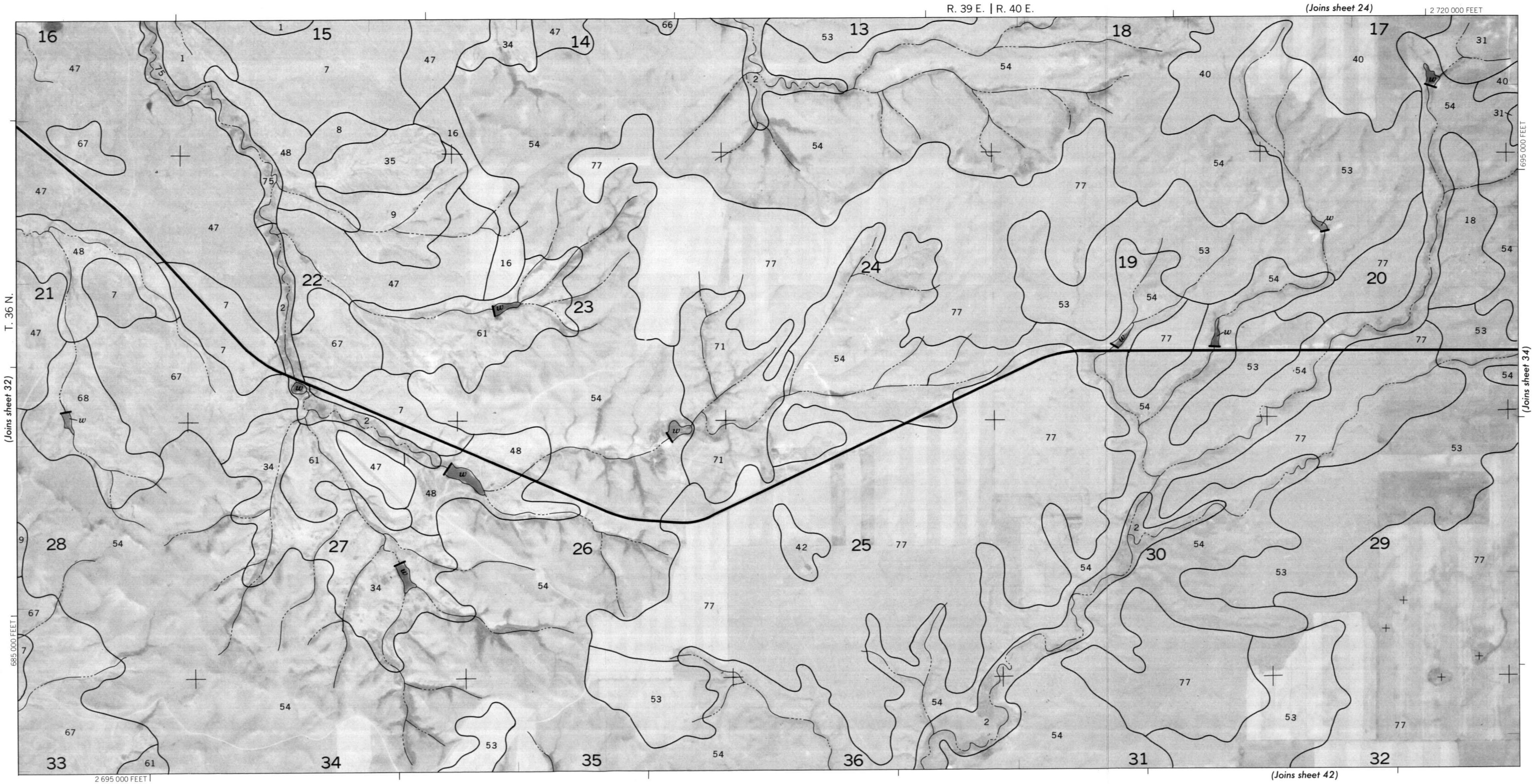
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

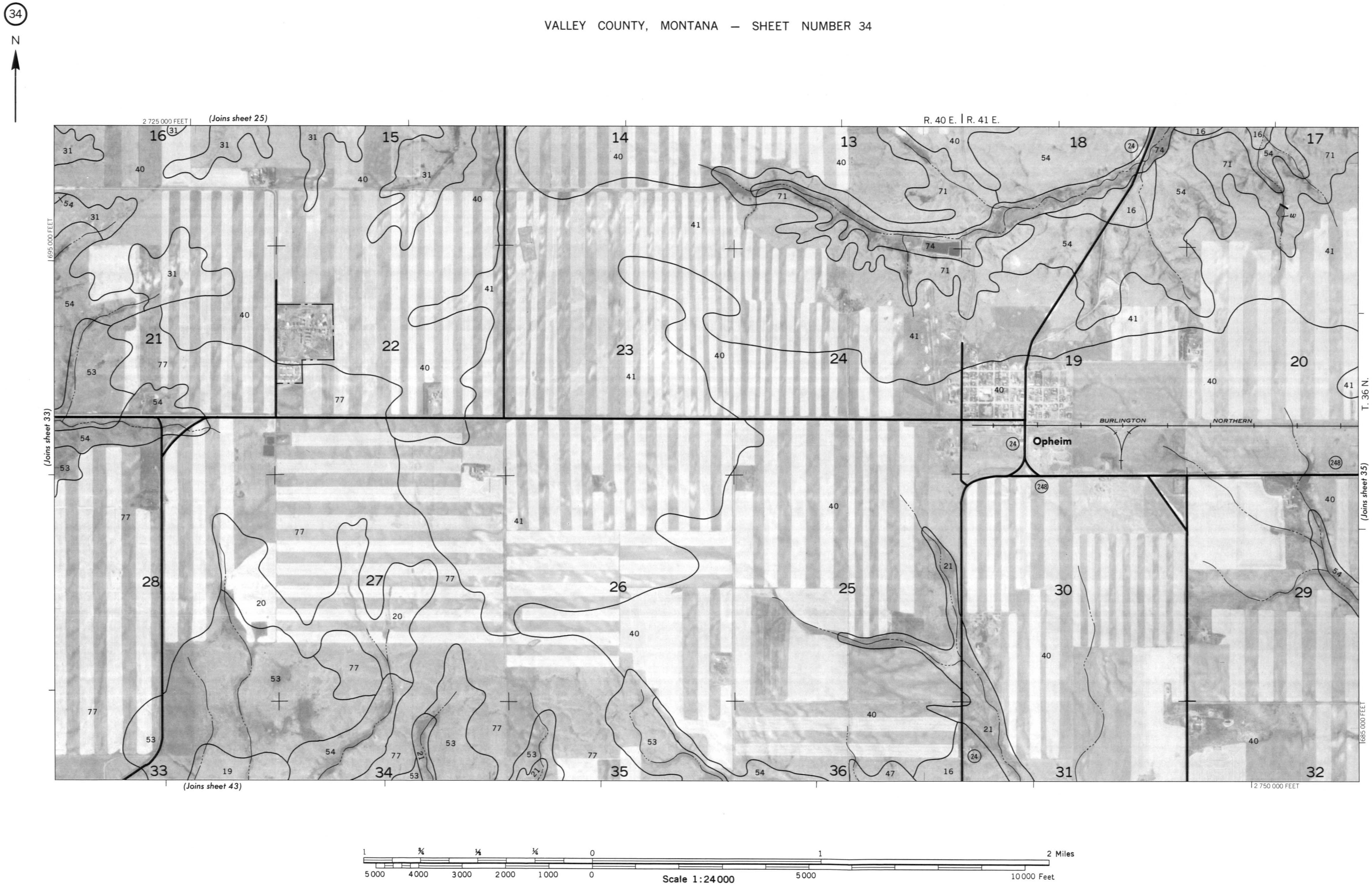
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 33

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 34



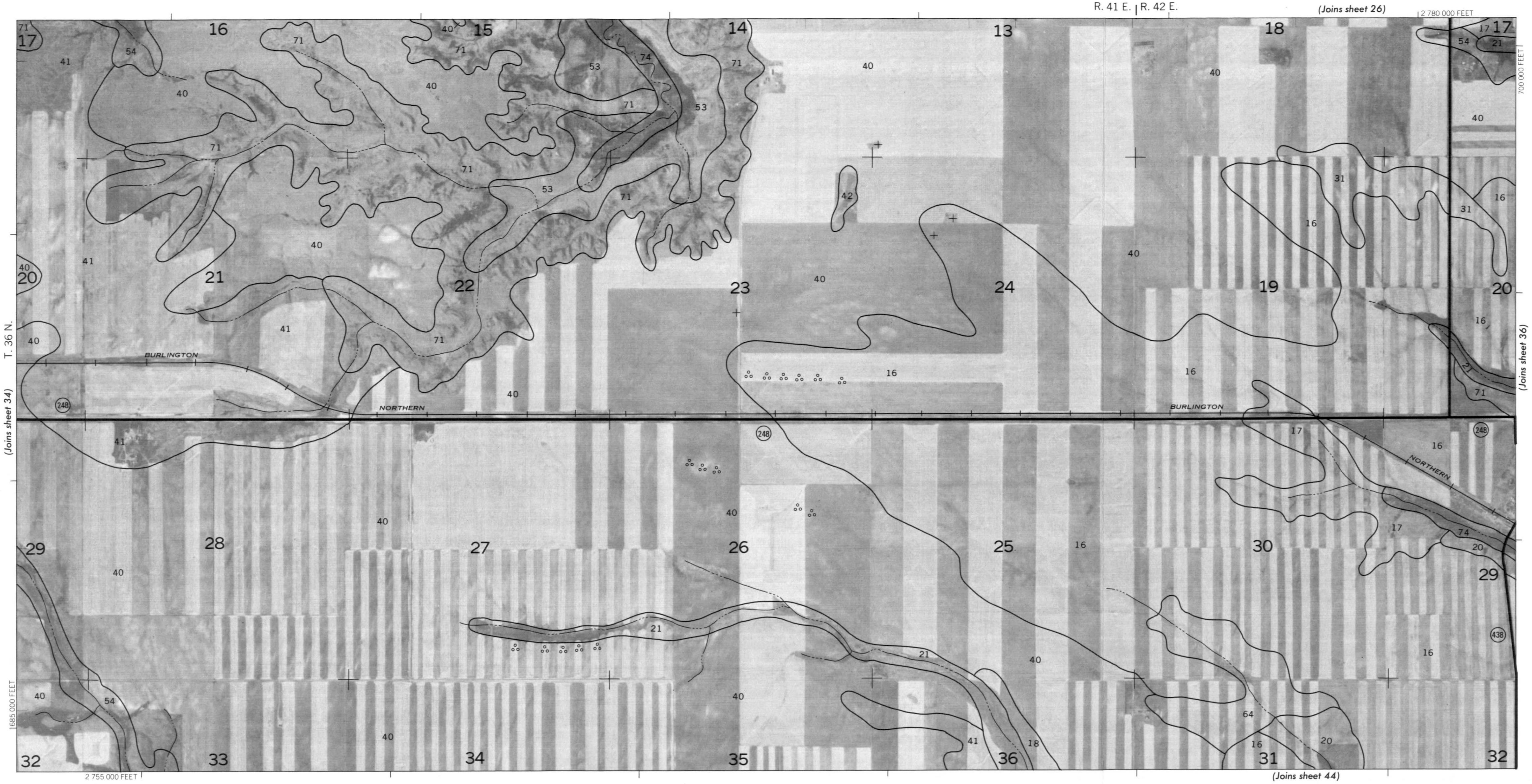
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

35

N

VALLEY COUNTY, MONTANA NO. 35

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

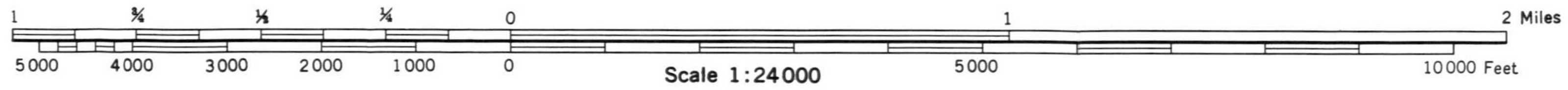


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 36



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

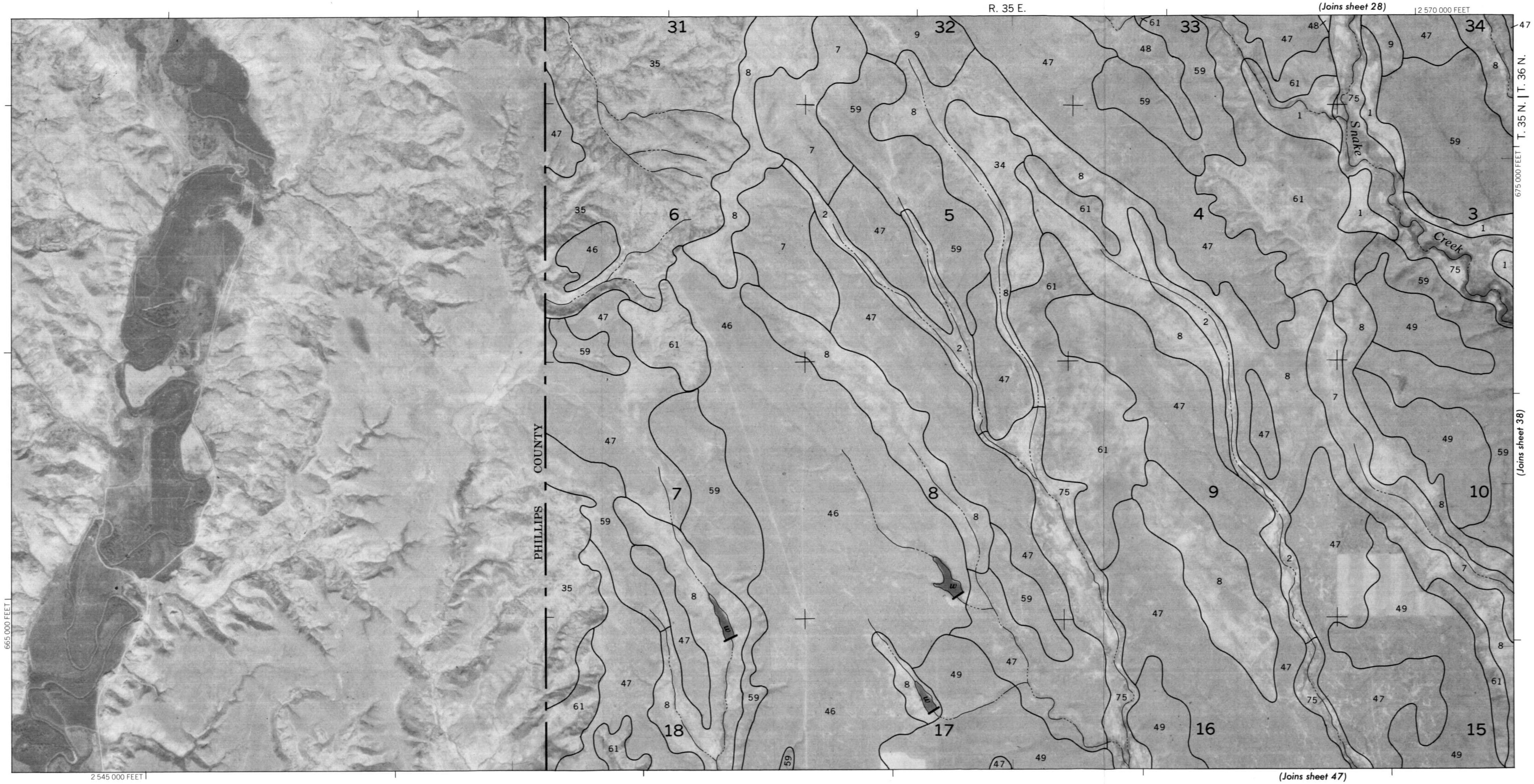
VALLEY COUNTY, MONTANA NO. 36

37

N

VALLEY COUNTY, MONTANA NO. 37

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

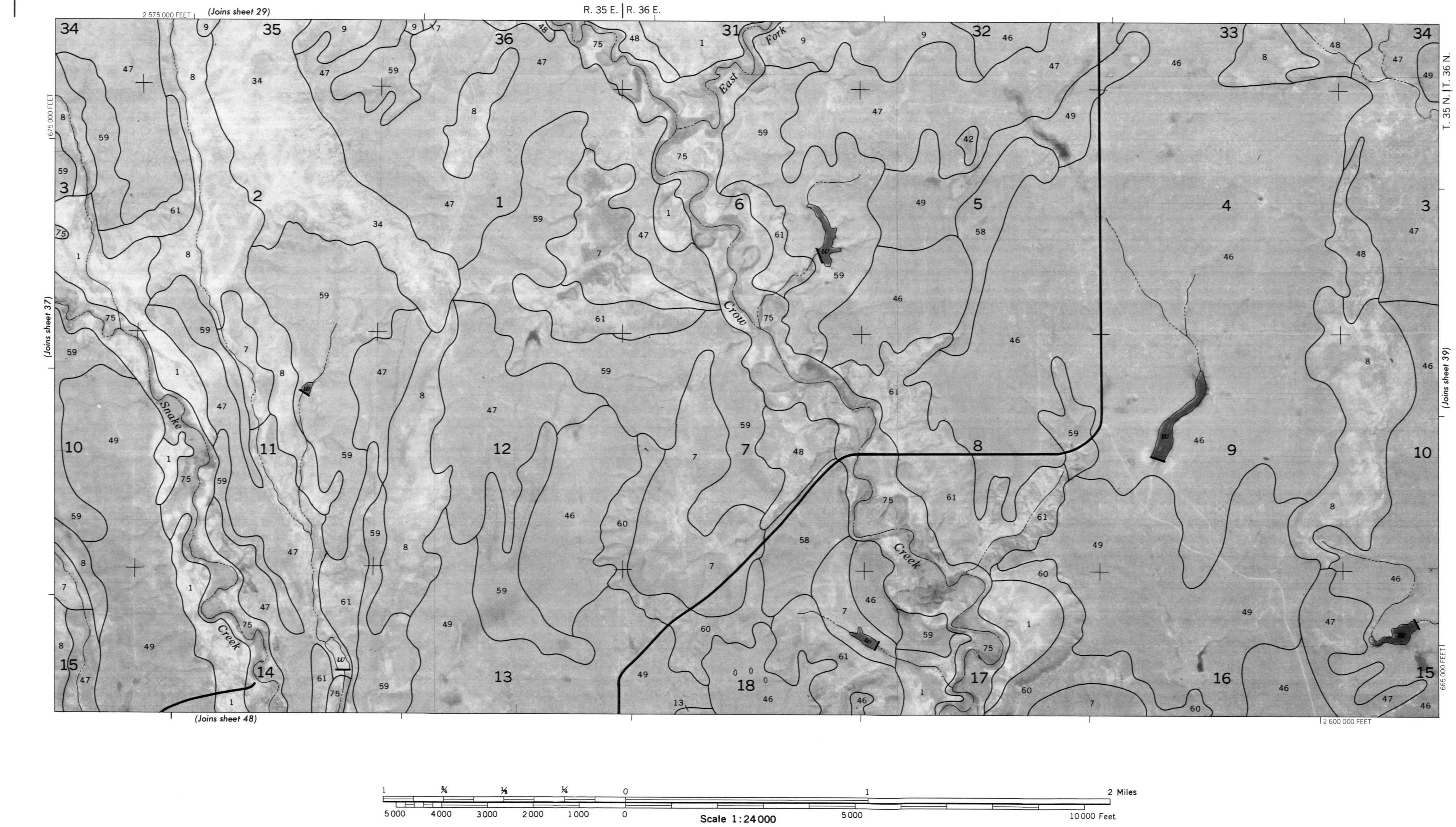


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

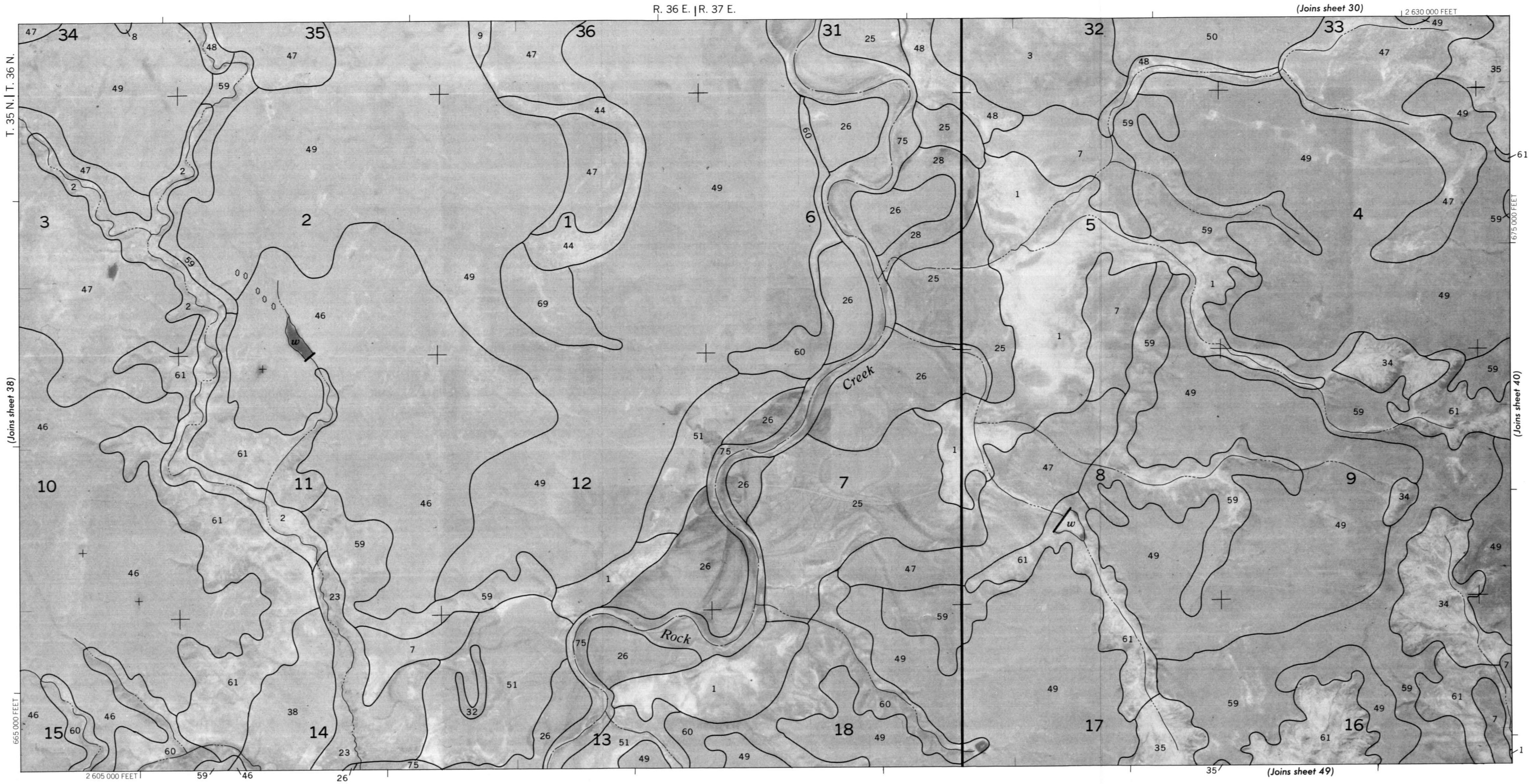
VALLEY COUNTY, MONTANA — SHEET NUMBER 38



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

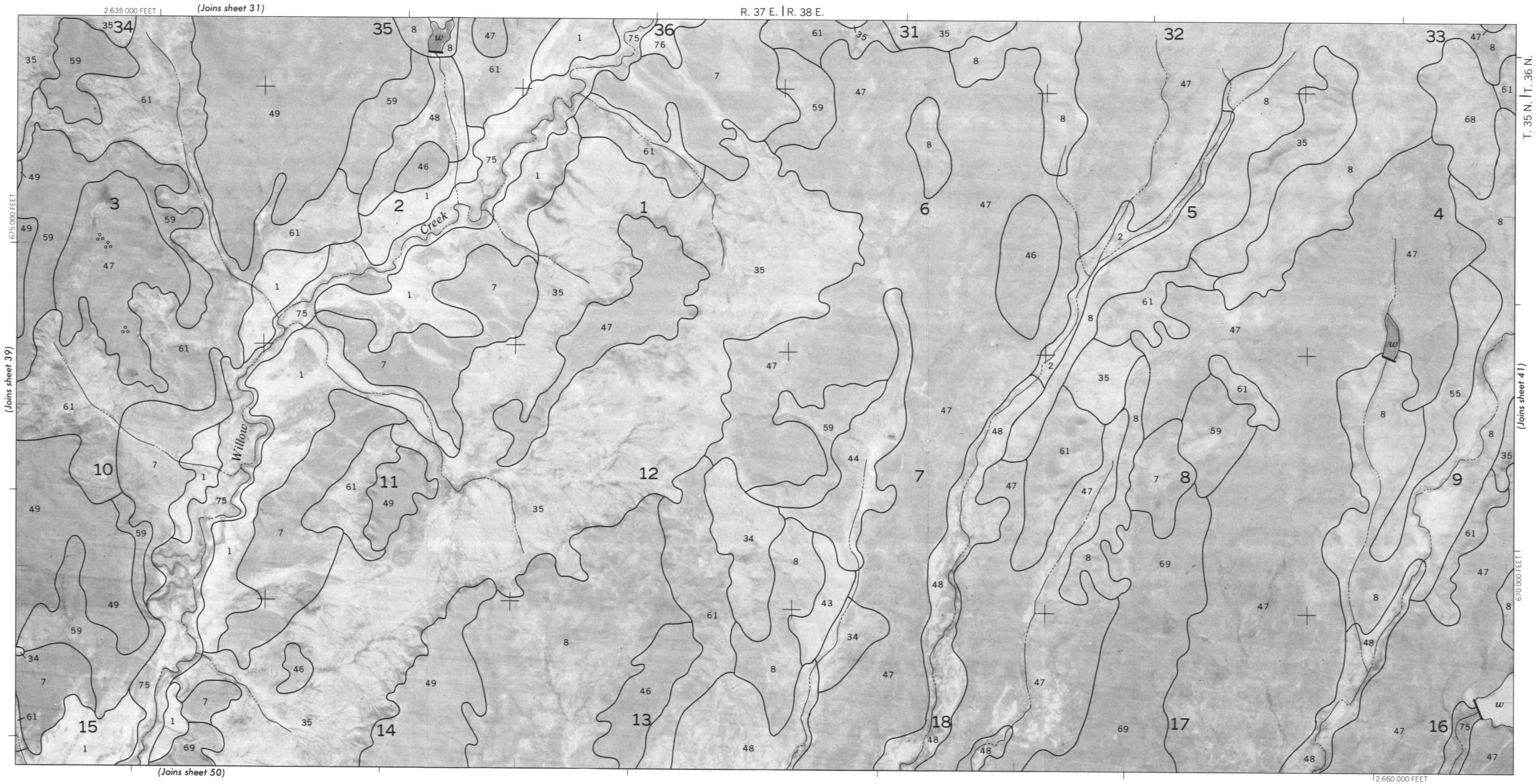
VALLEY COUNTY, MONTANA NO. 39

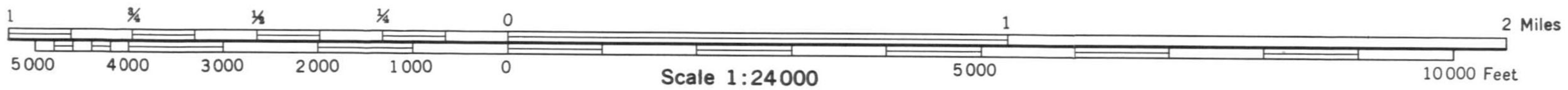
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 40



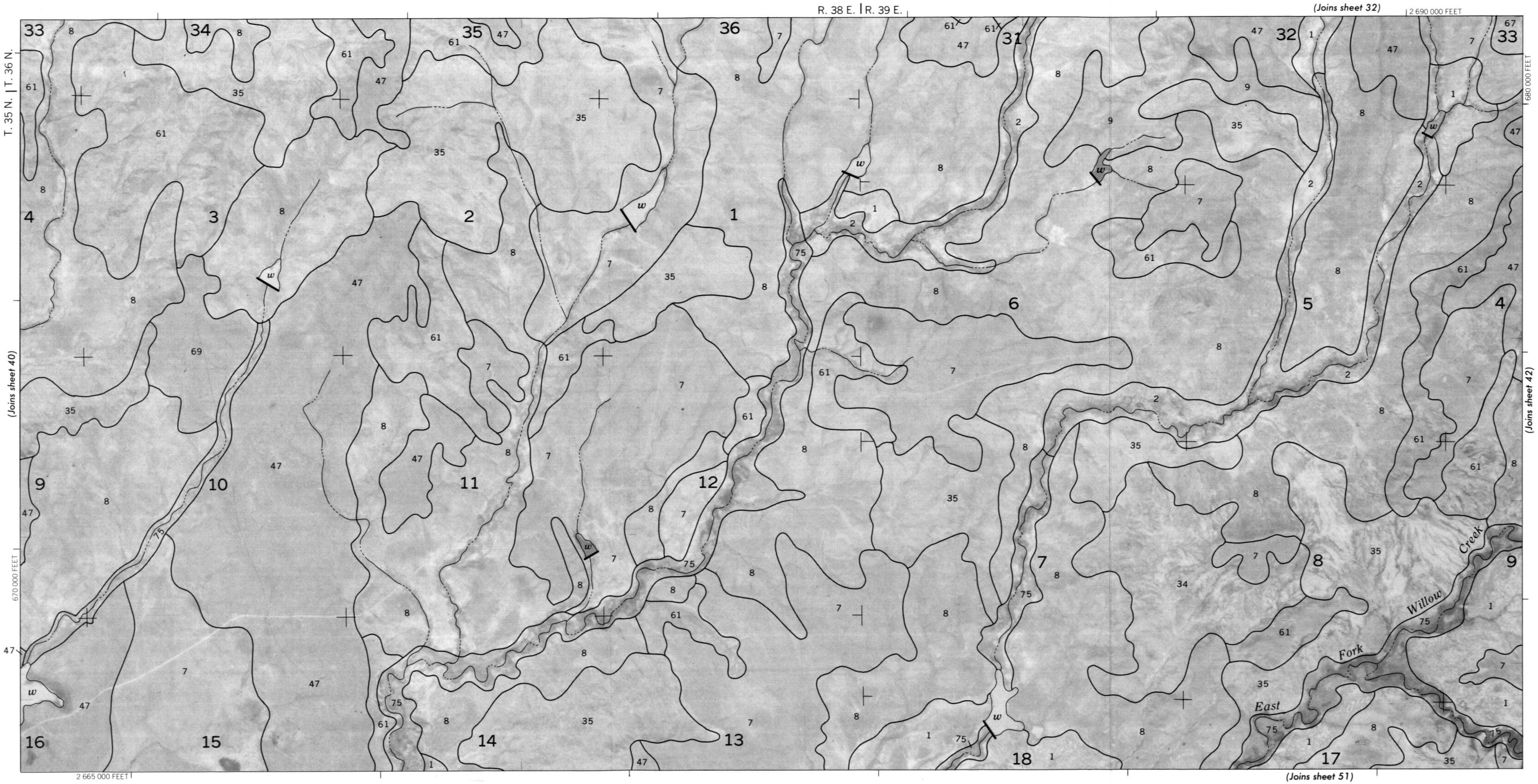


Scale 1:24 000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

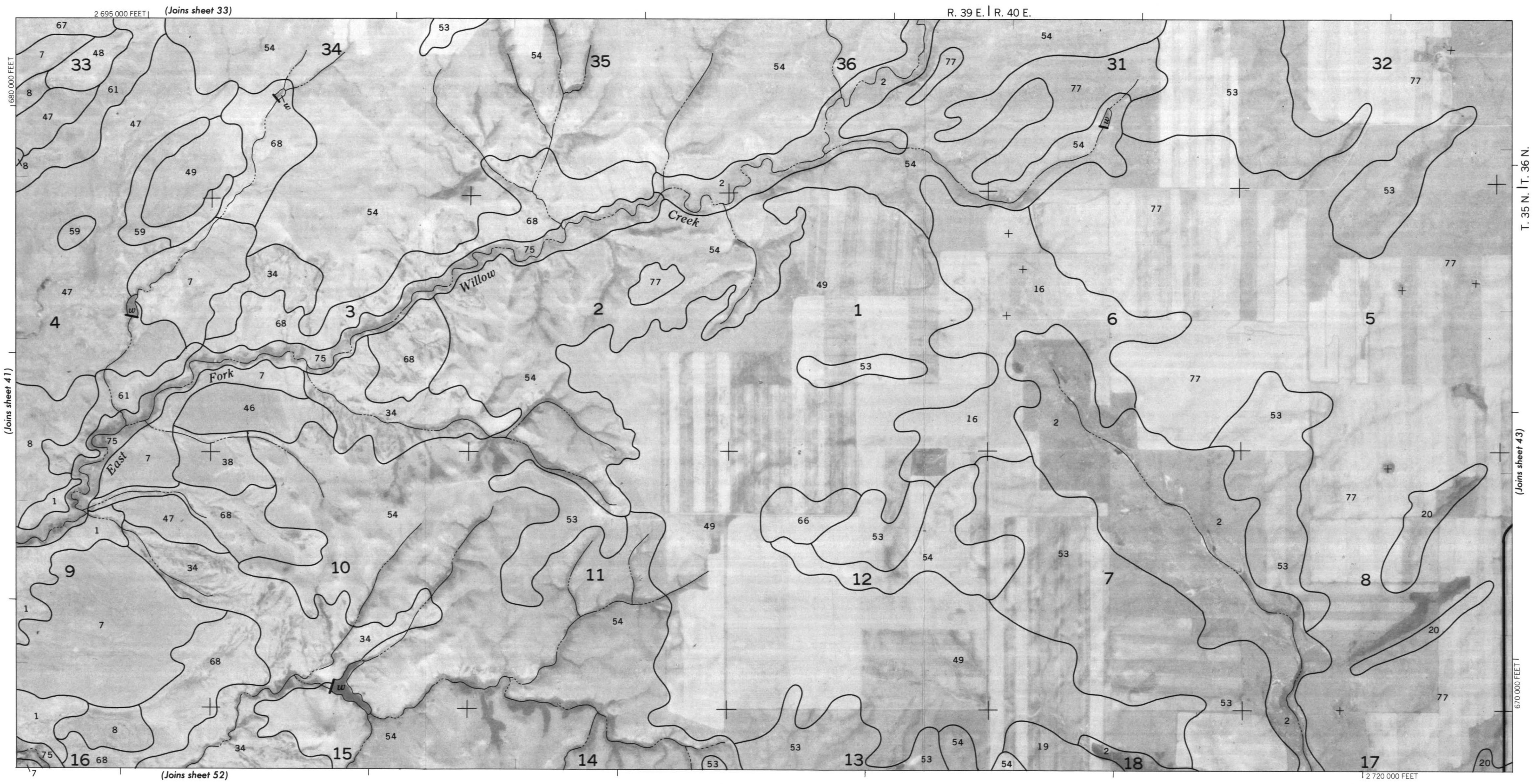
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 41

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

VALLEY COUNTY, MONTANA — SHEET NUMBER 42

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

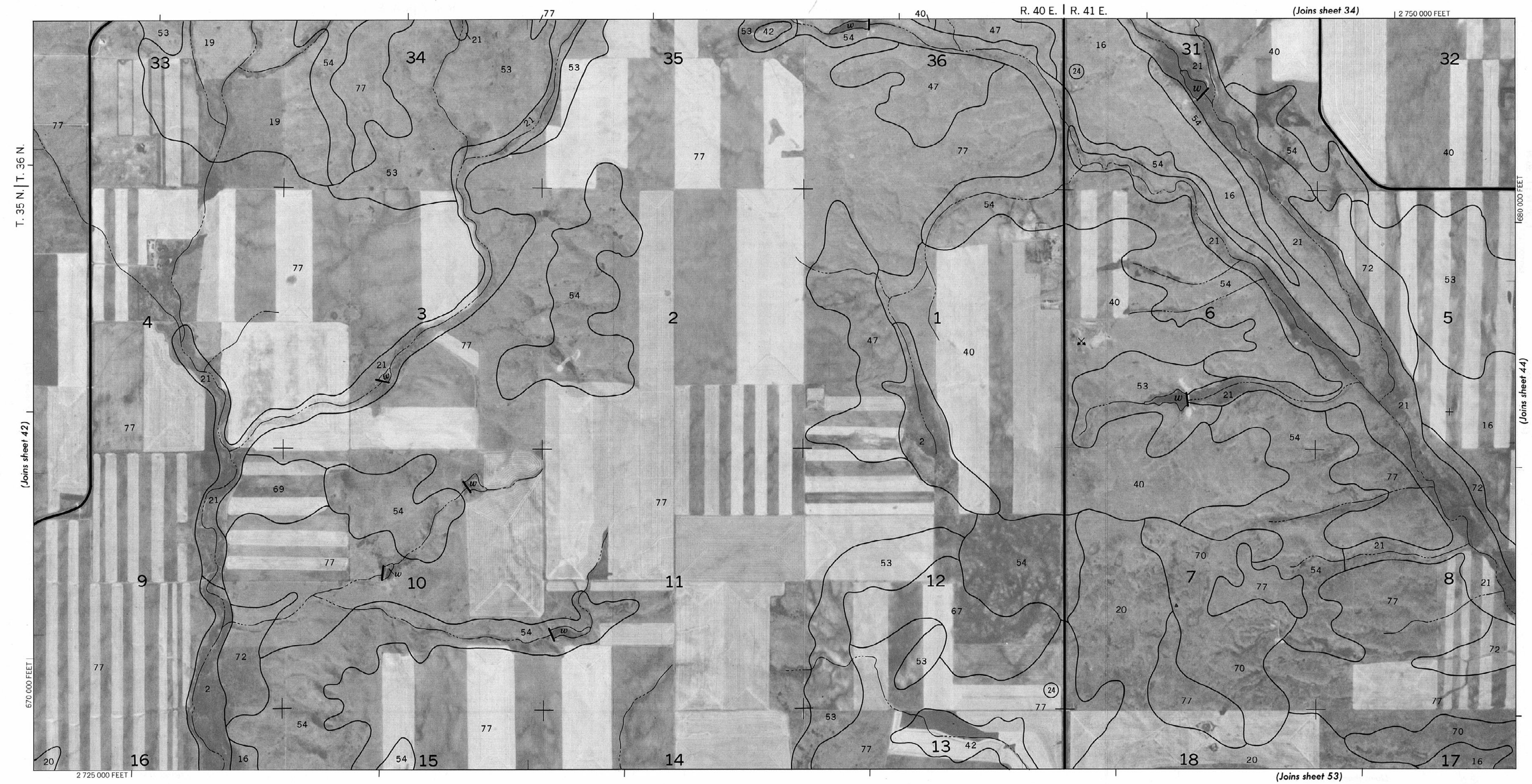
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA — SHEET NUMBER 43

N

This map was compiled on 1974 1975 and 1976 U.S. Department of the Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

44

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 44

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

Scale 1:24 000

VALLEY COUNTY, MONTANA NO. 45

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5 000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

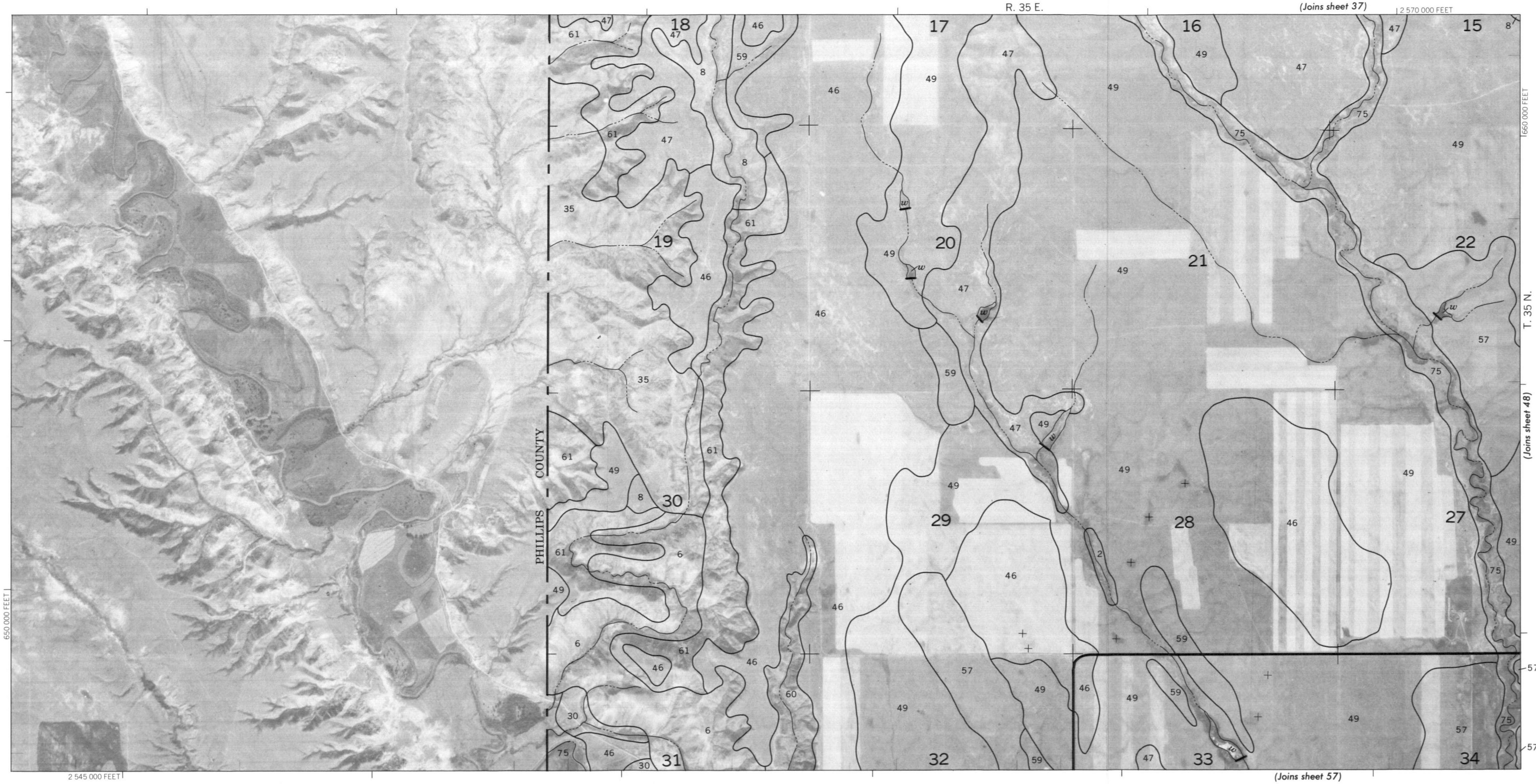
VALLEY COUNTY, MONTANA — SHEET NUMBER 46

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

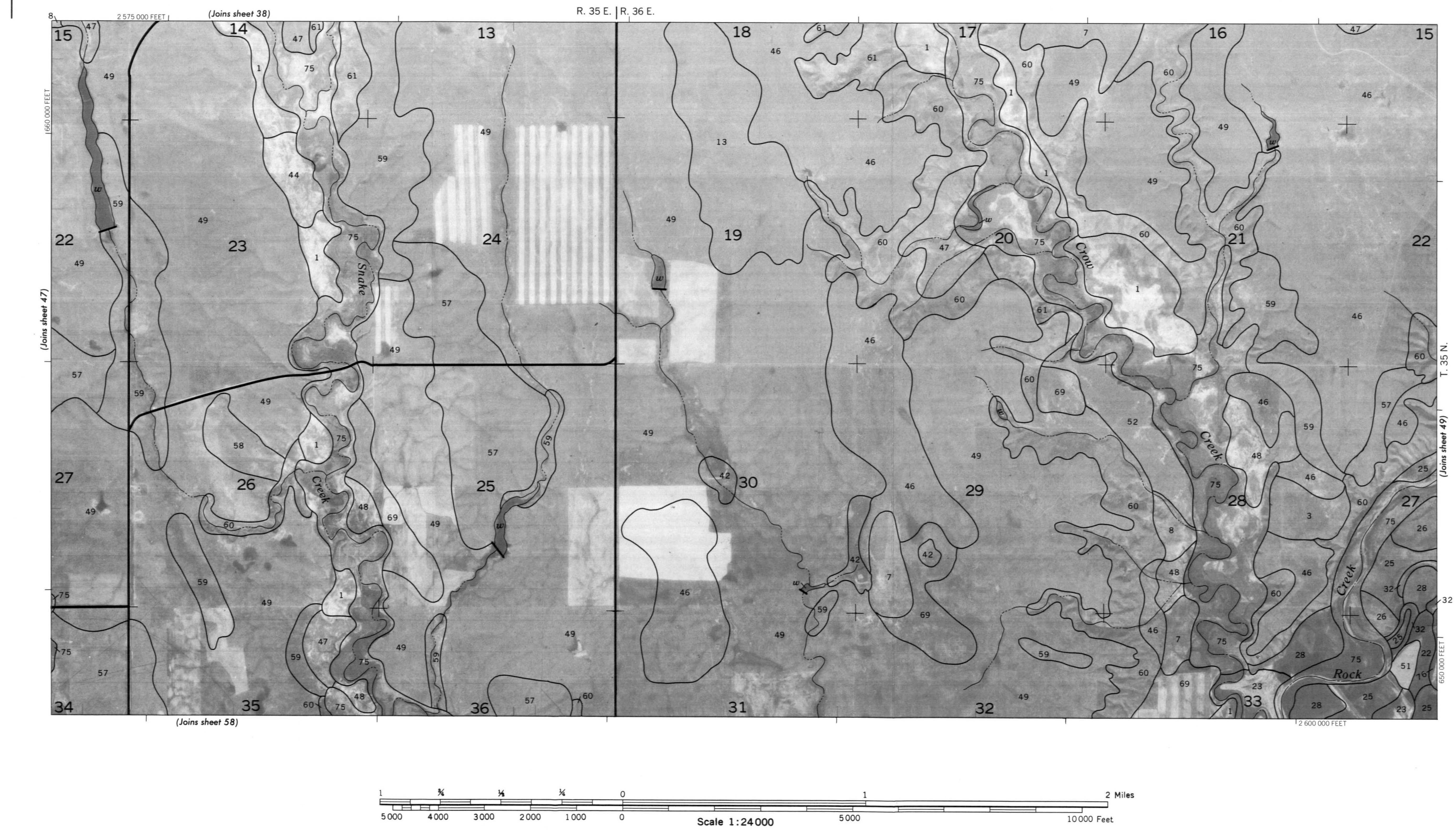
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 47

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

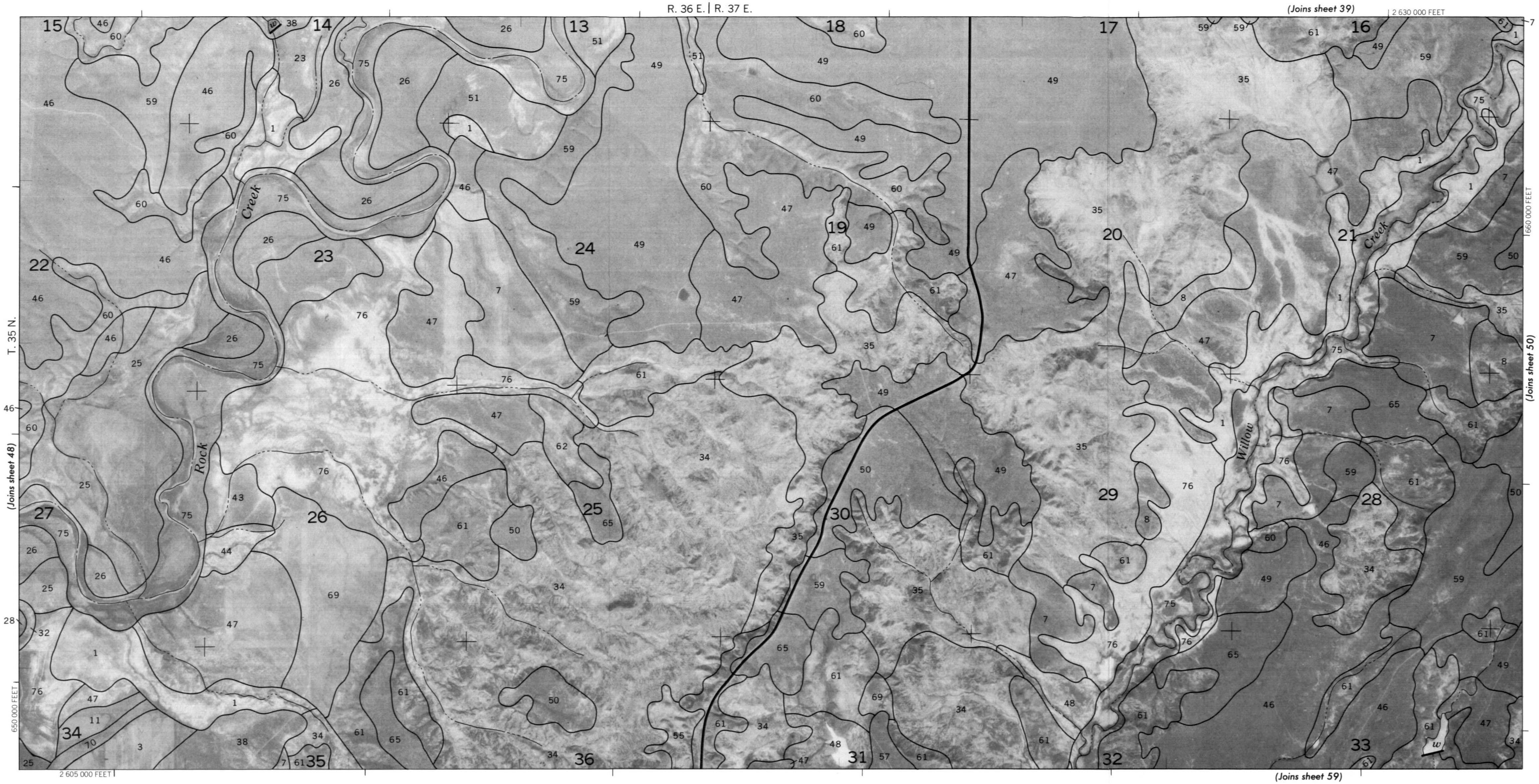
VALLEY COUNTY, MONTANA — SHEET NUMBER 48



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



VALLEY COUNTY, MONTANA NO. 49

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

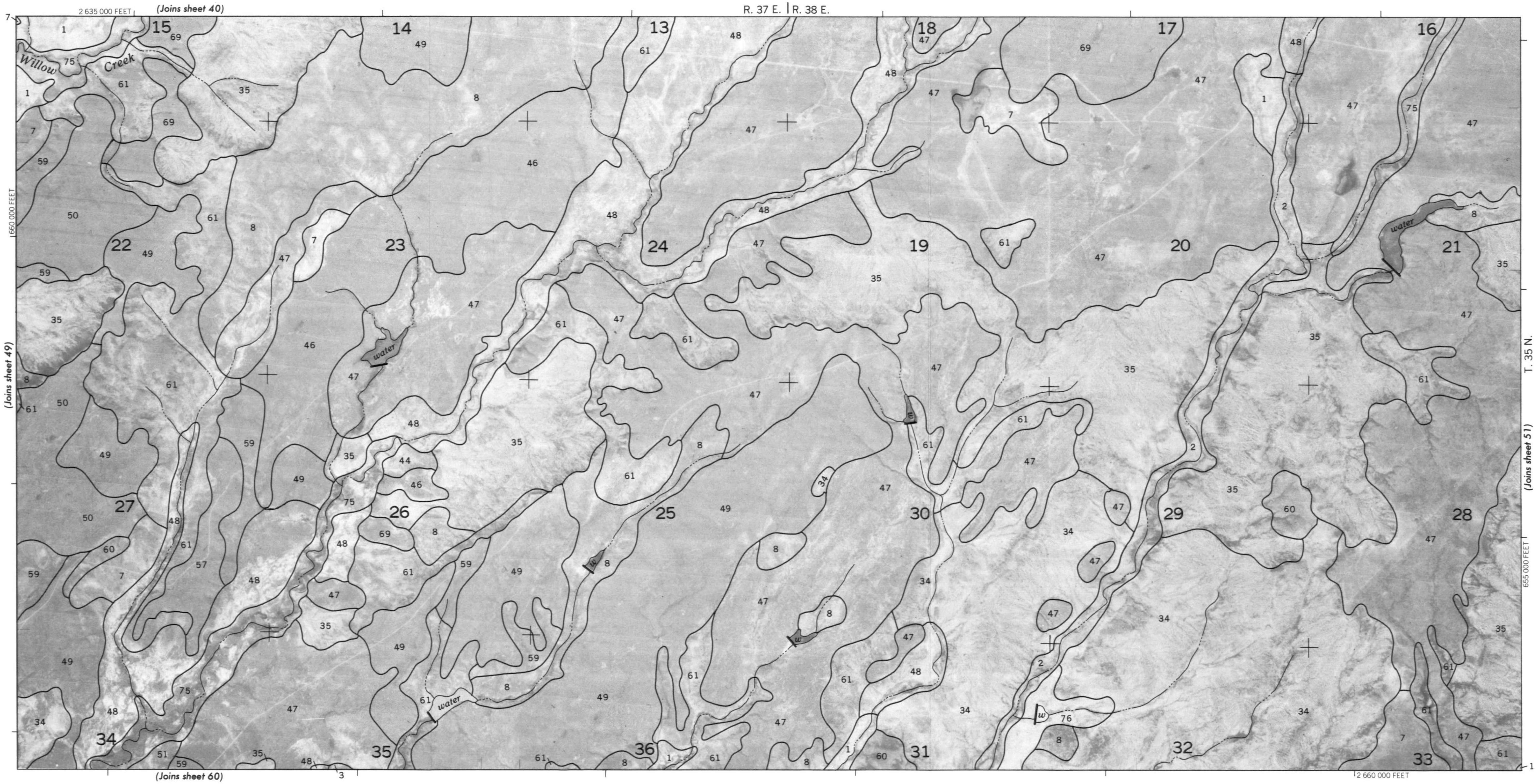
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

50

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

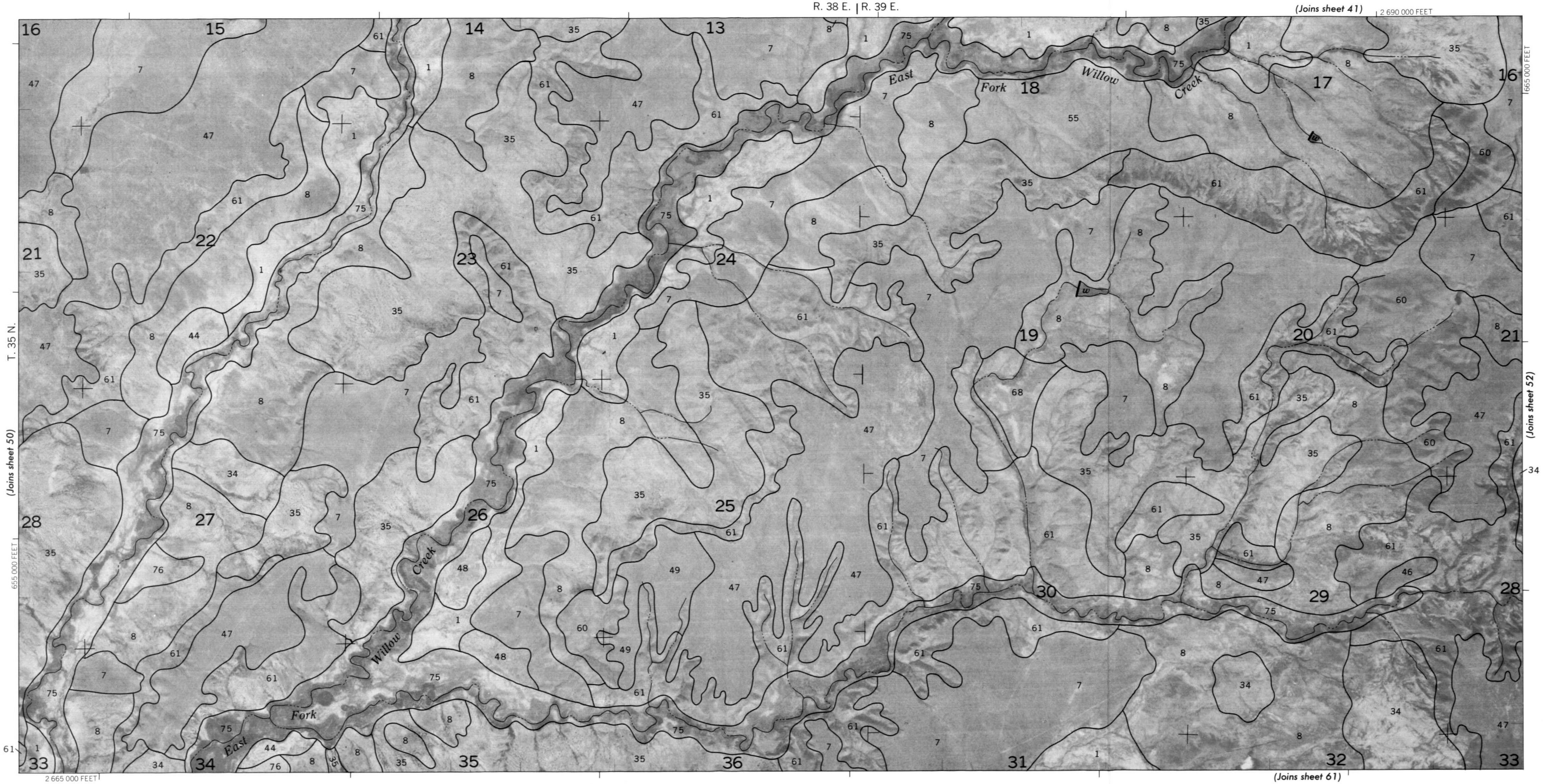
Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

51

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 51

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 52

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA — SHEET NUMBER 53

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 54

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

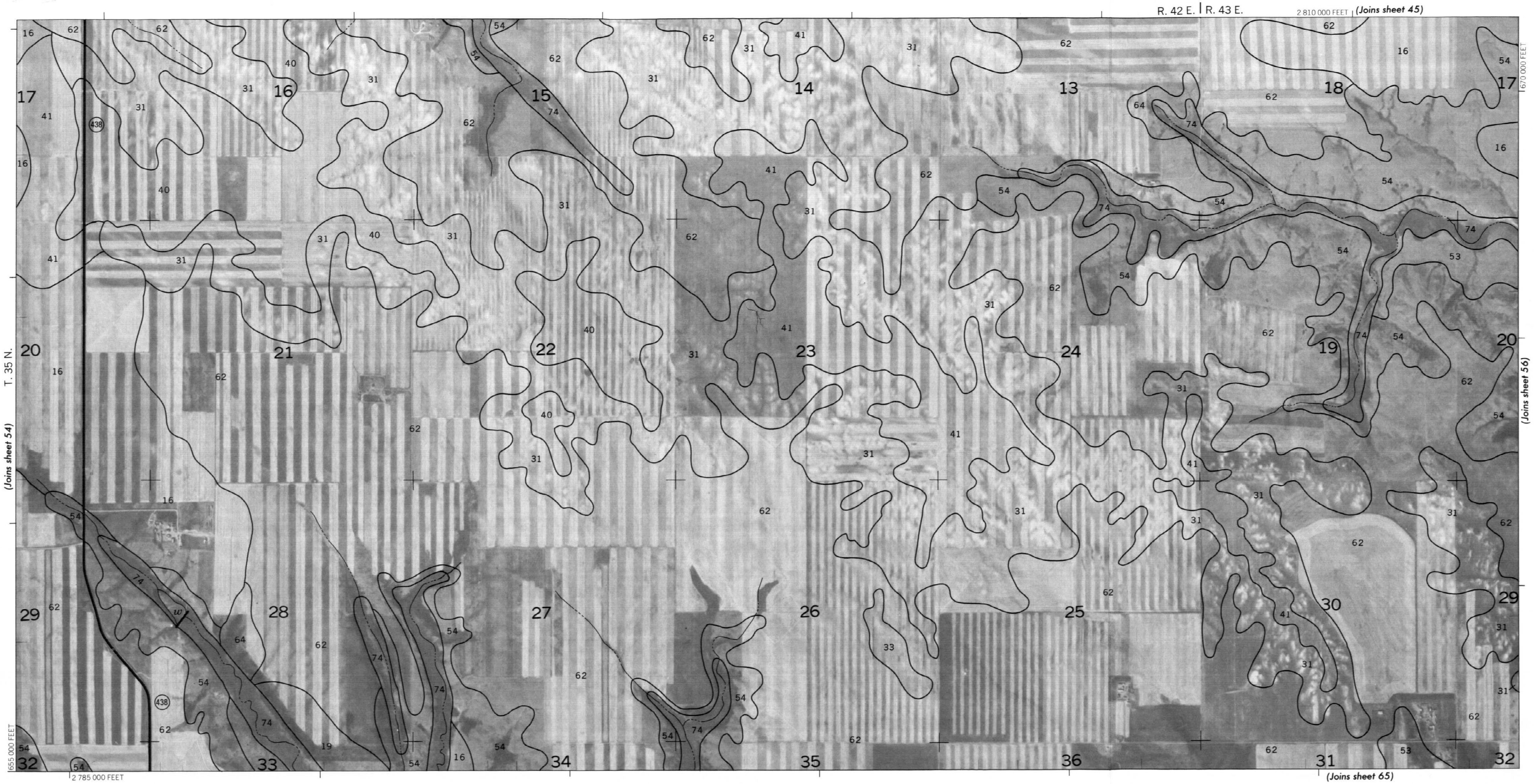
Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

55

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

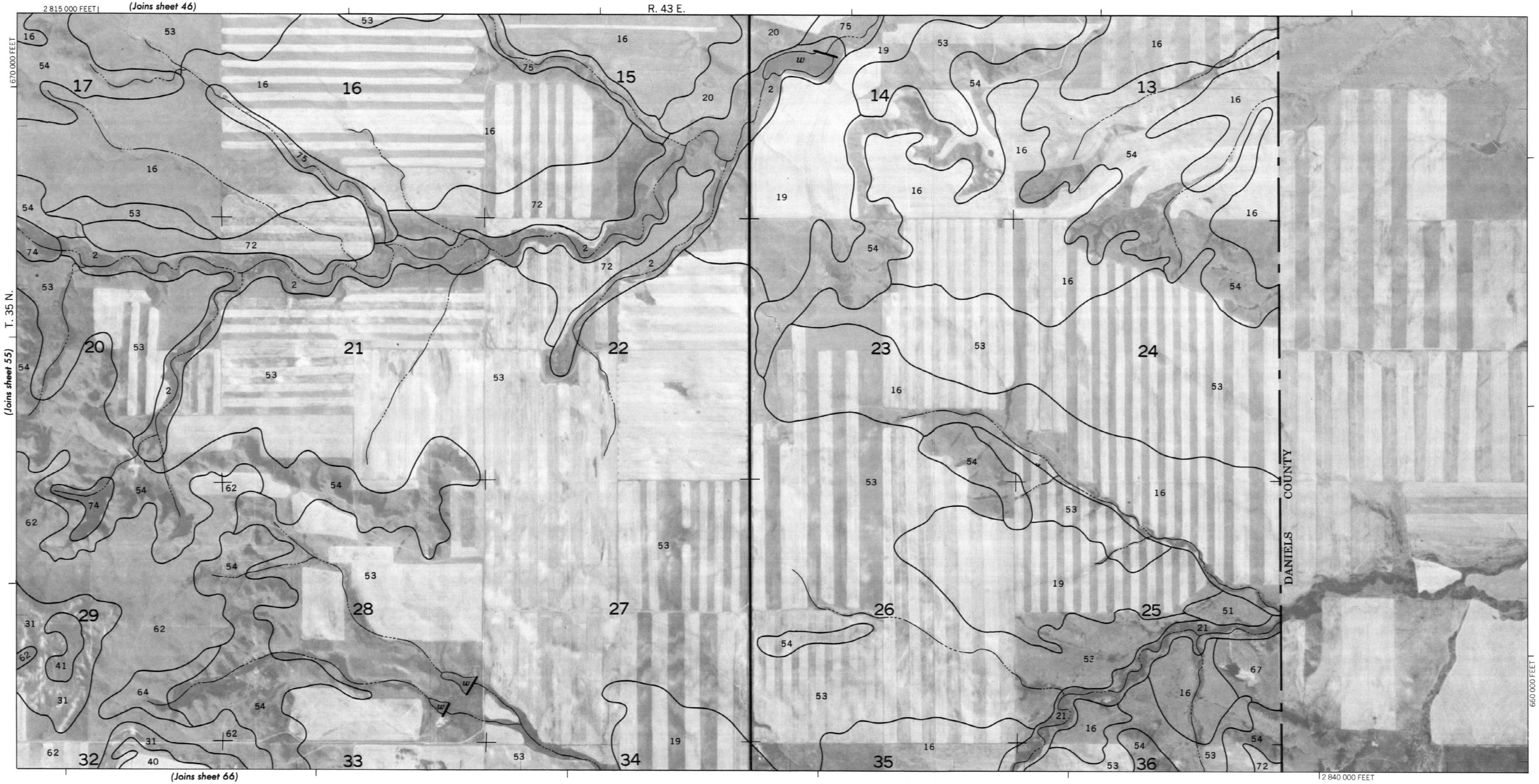
VALLEY COUNTY, MONTANA NO. 55

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

56

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 56



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24 000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

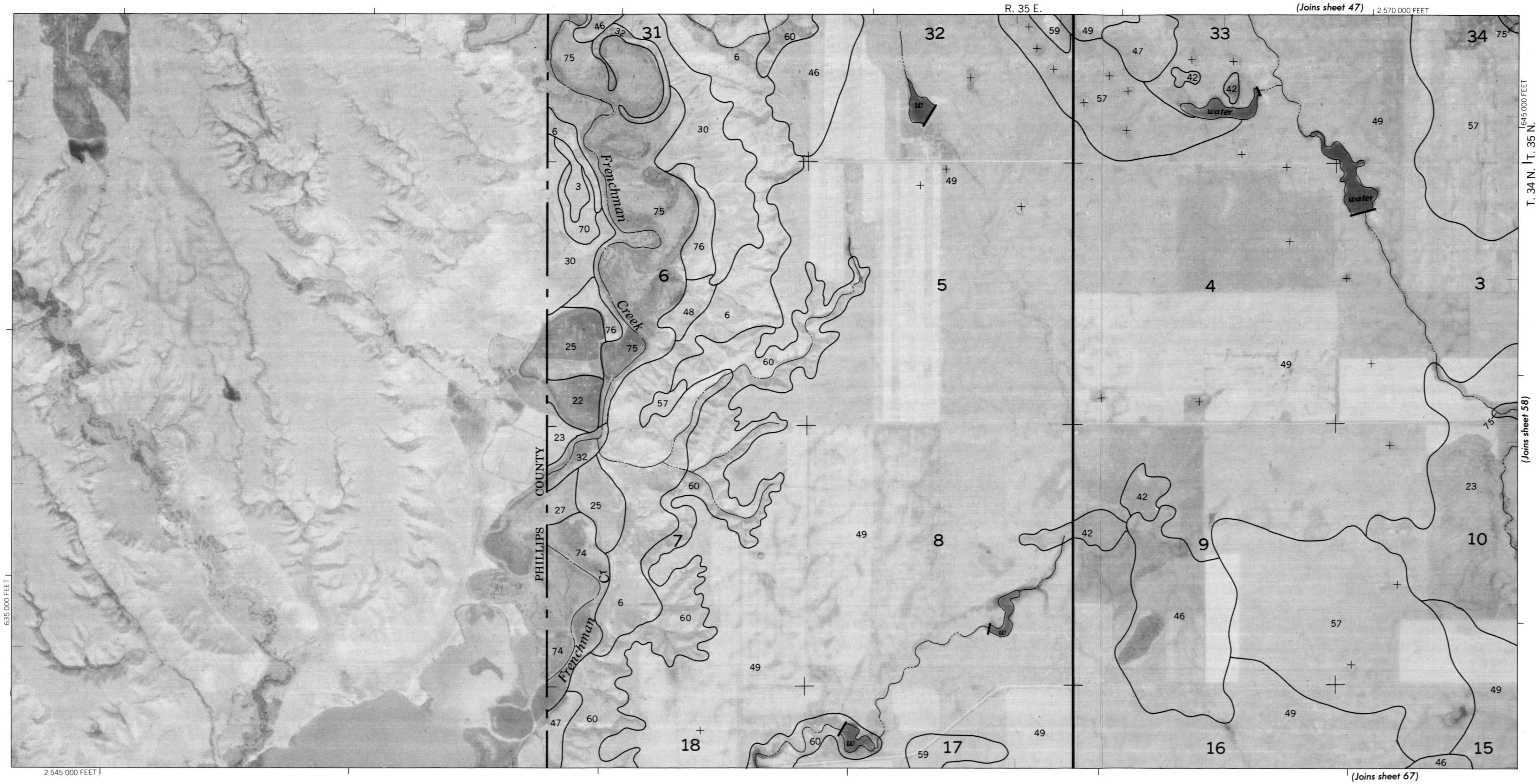
VALLEY COUNTY, MONTANA NO. 56

57

N

VALLEY COUNTY, MONTANA NO. 57

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



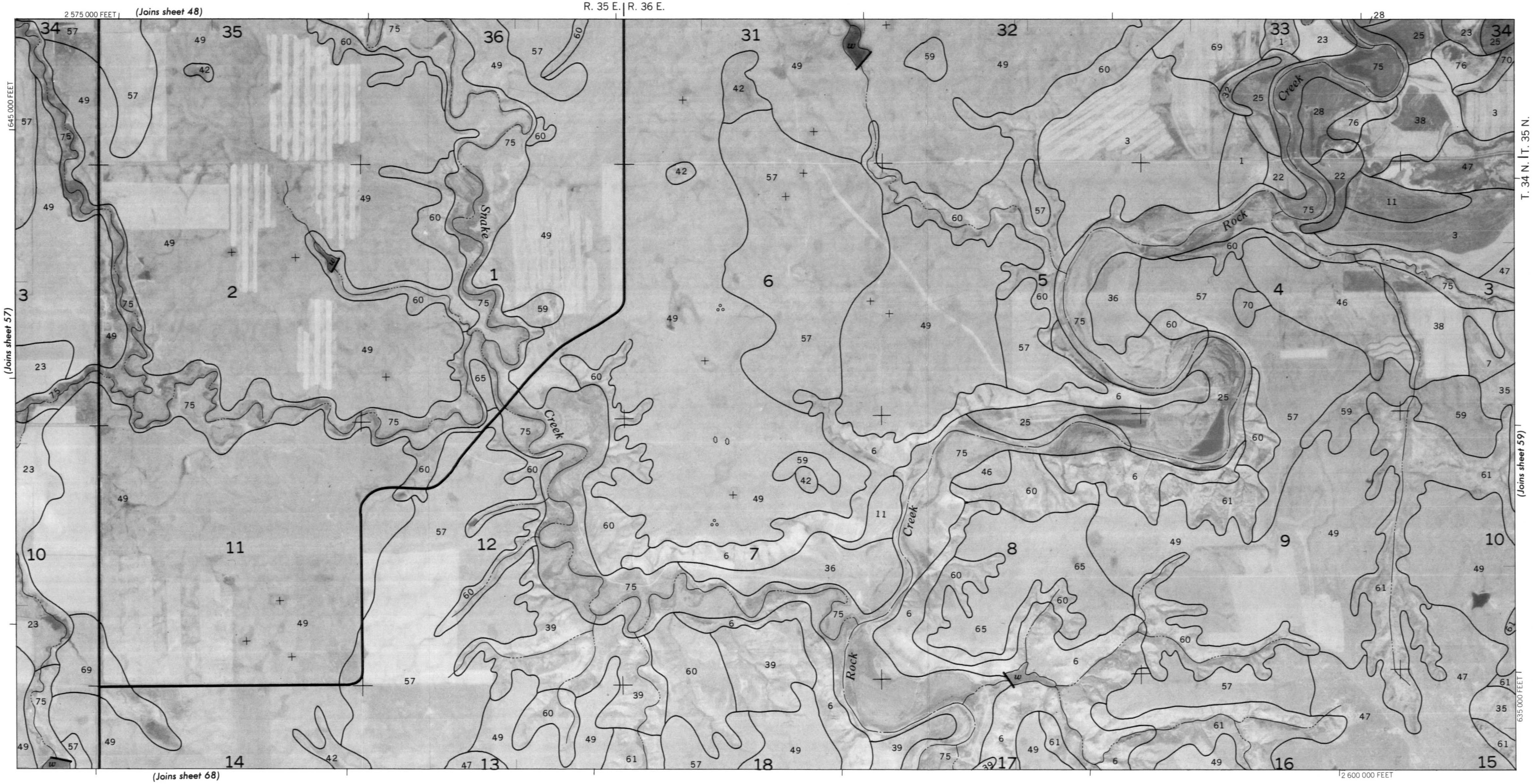
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 58



1 ¾ ½ ¼ 0 1 2 Miles

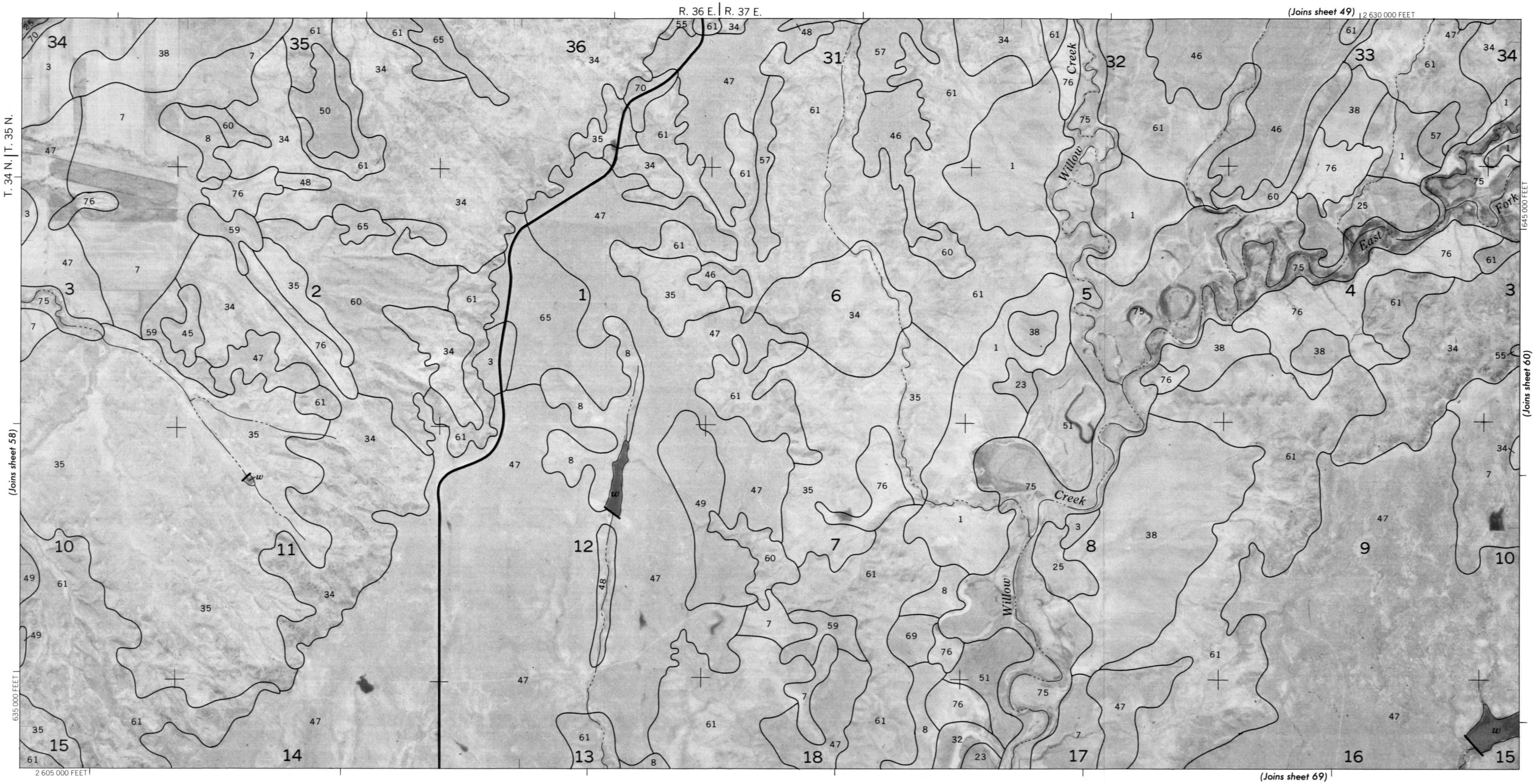
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 60

N

1 ¾ ½ ¼ 0 1 2 Miles

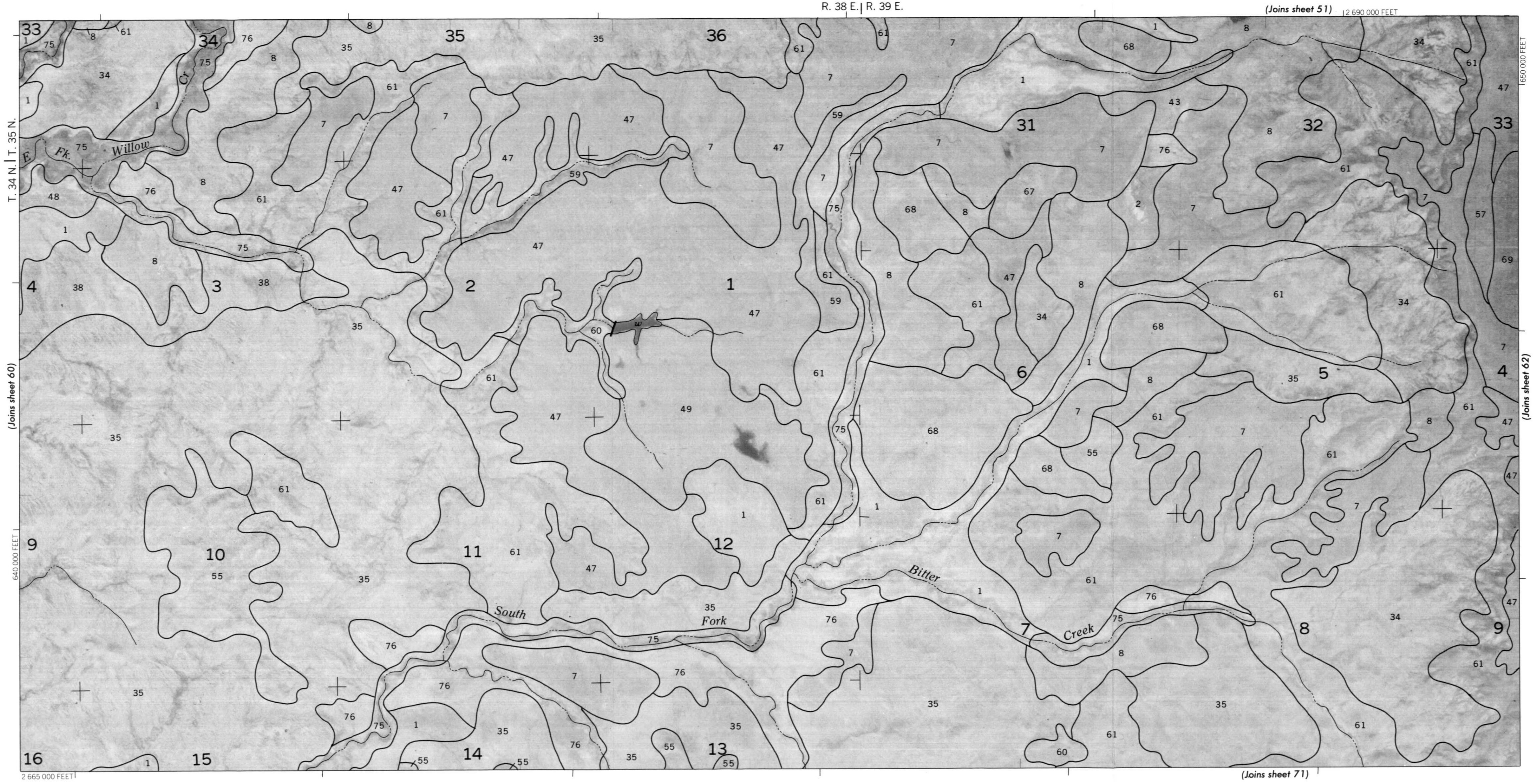
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24 000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

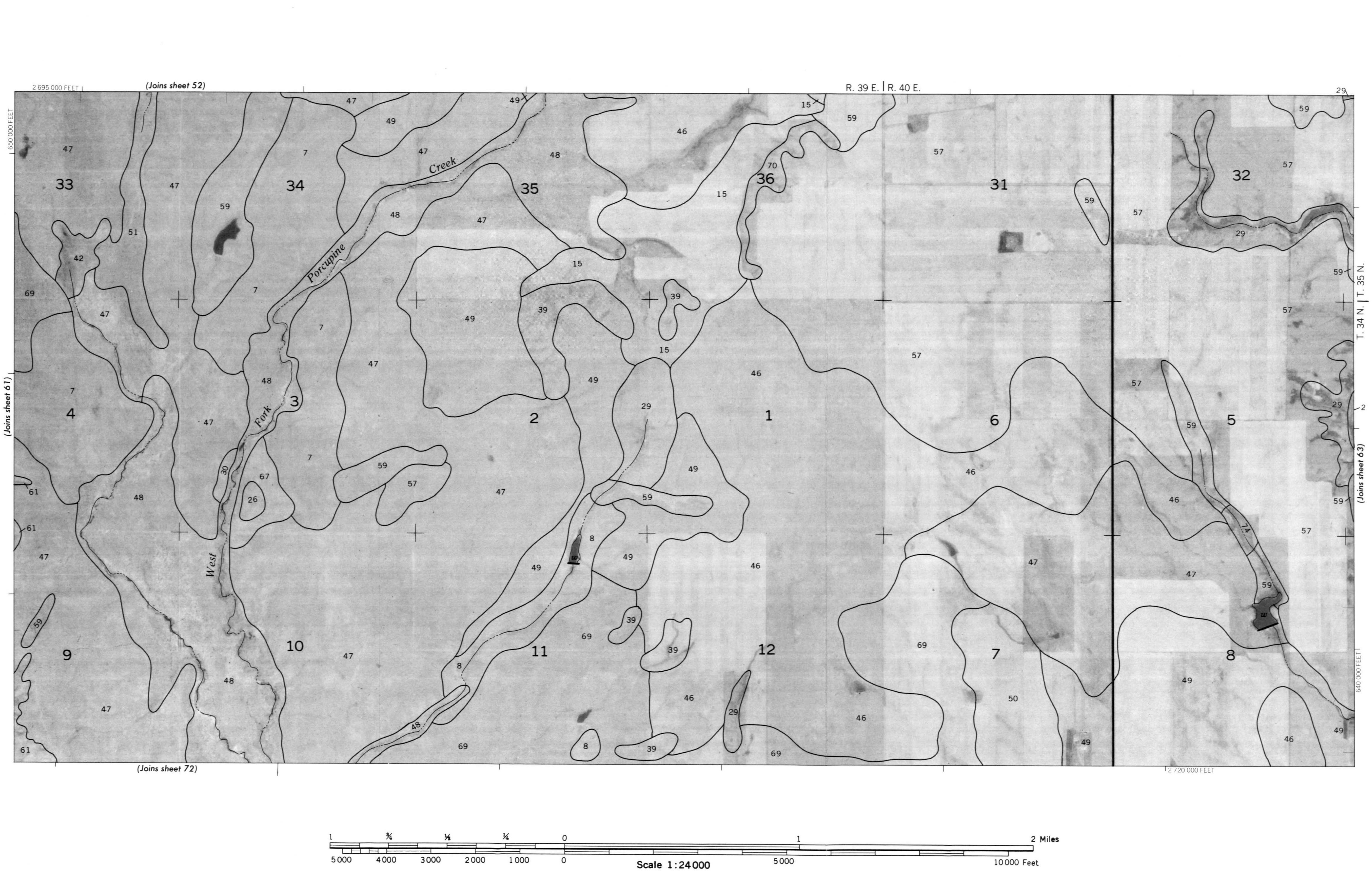
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 61

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

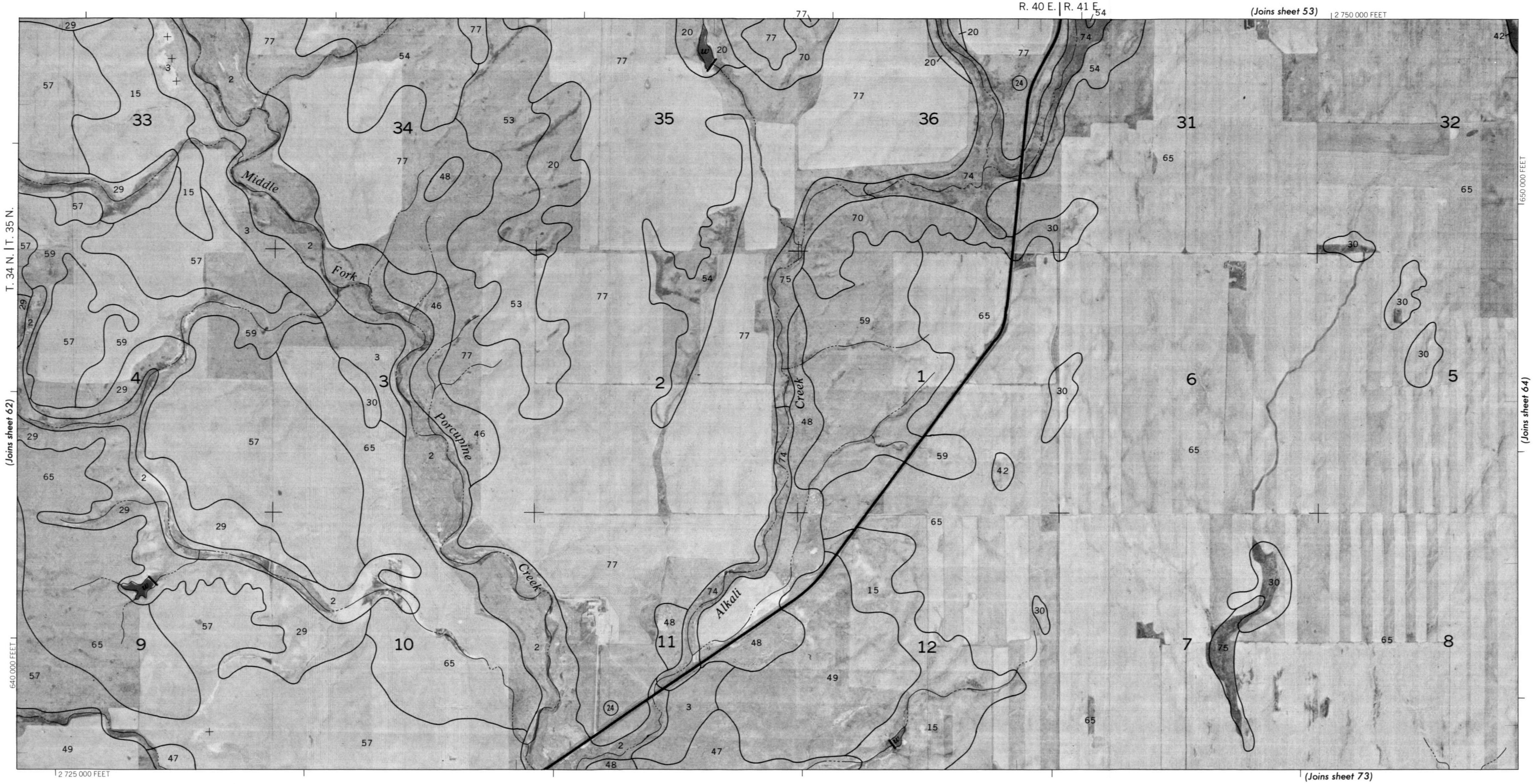
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 62



5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

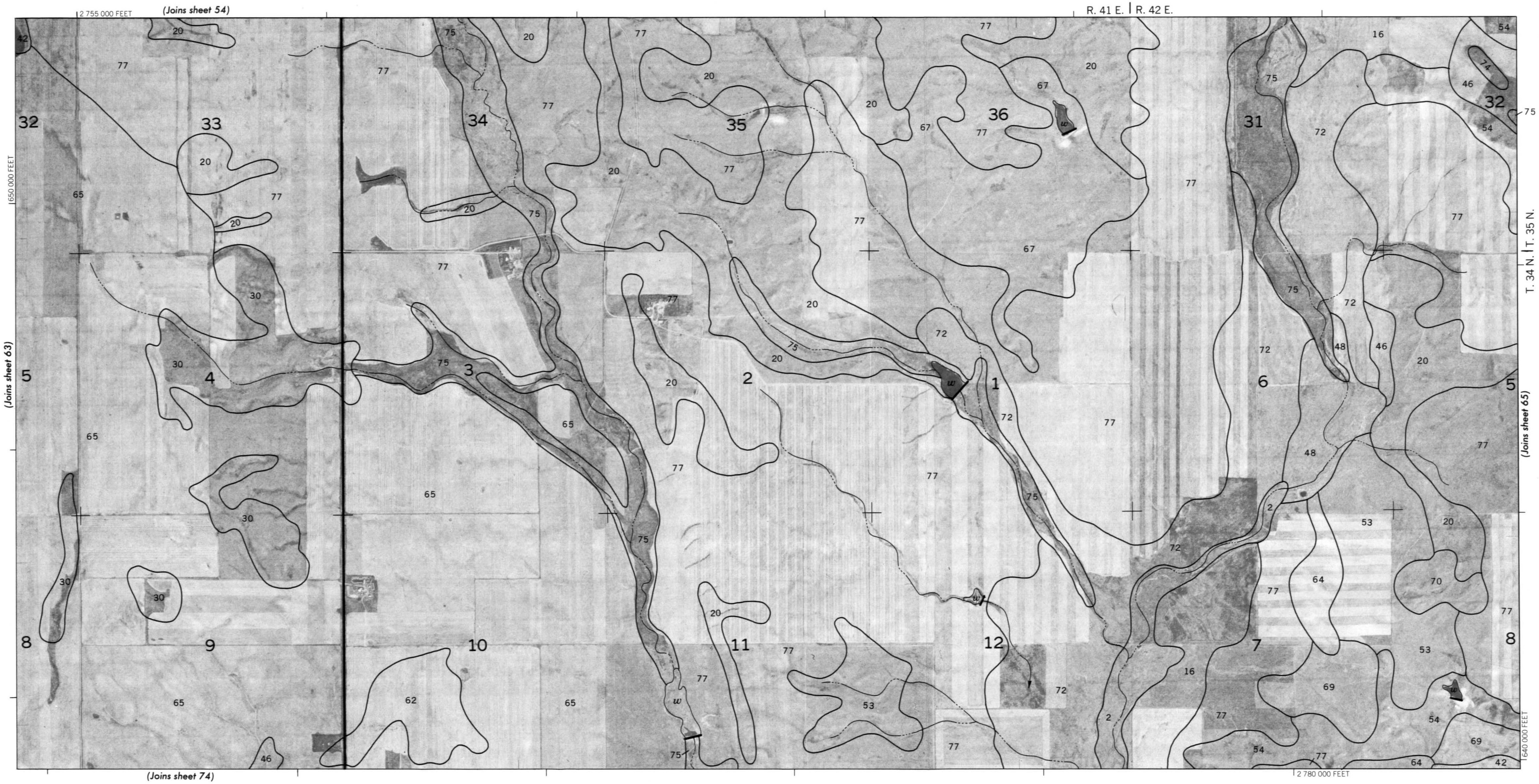
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 63

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 64



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 64

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

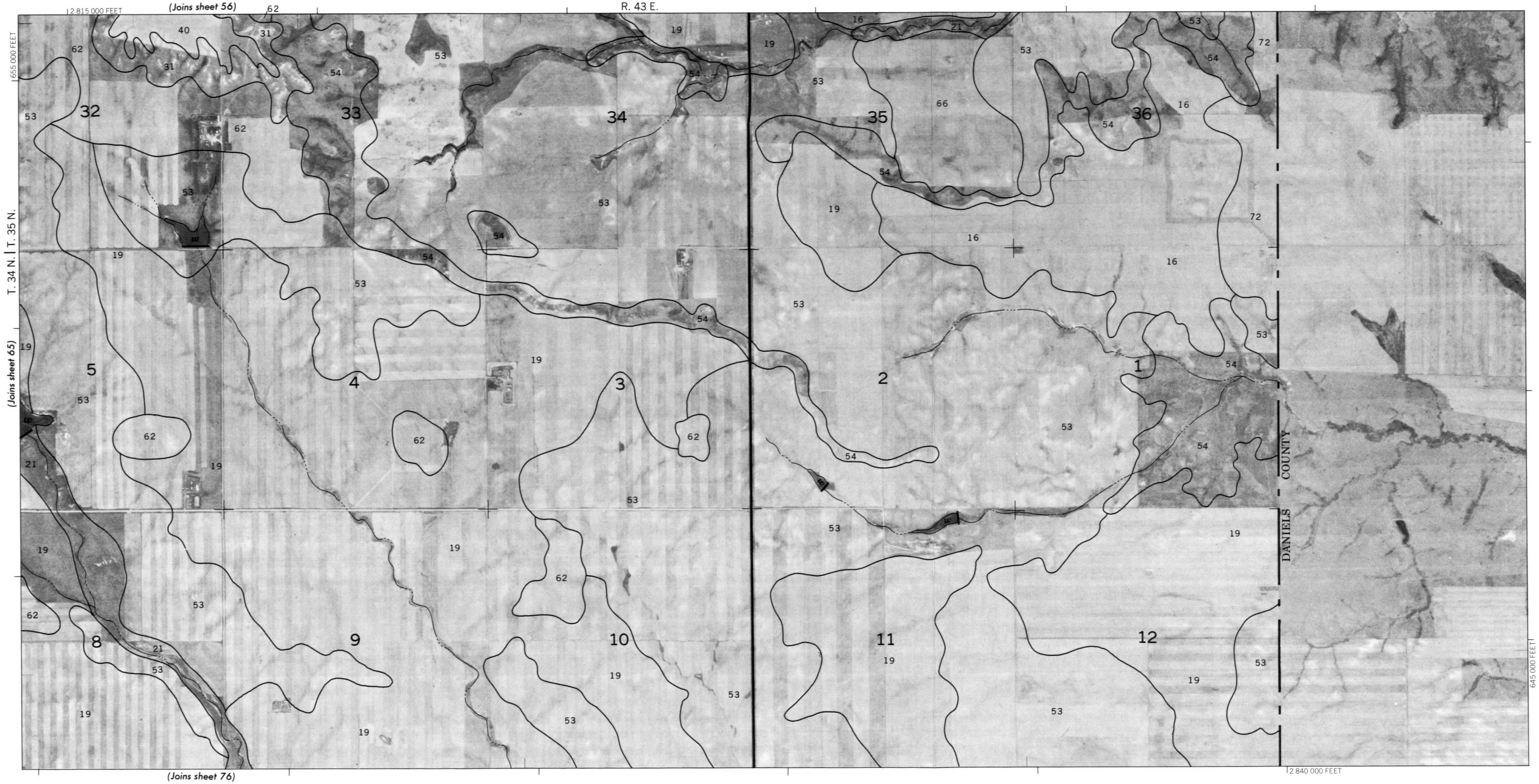
Scale 1:24000

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

66

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 66



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

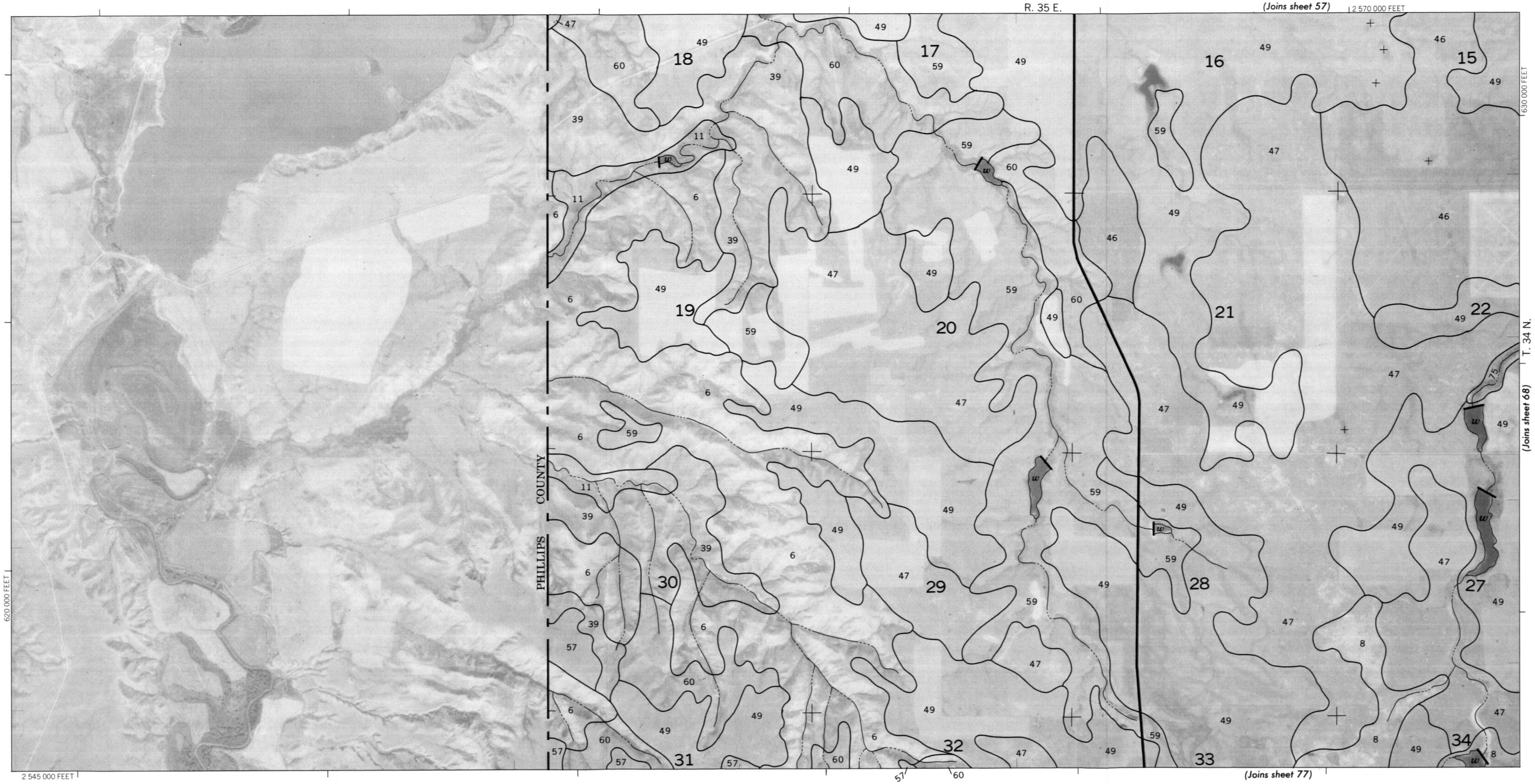
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 66

N



1 ½ ¼ ⅛ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

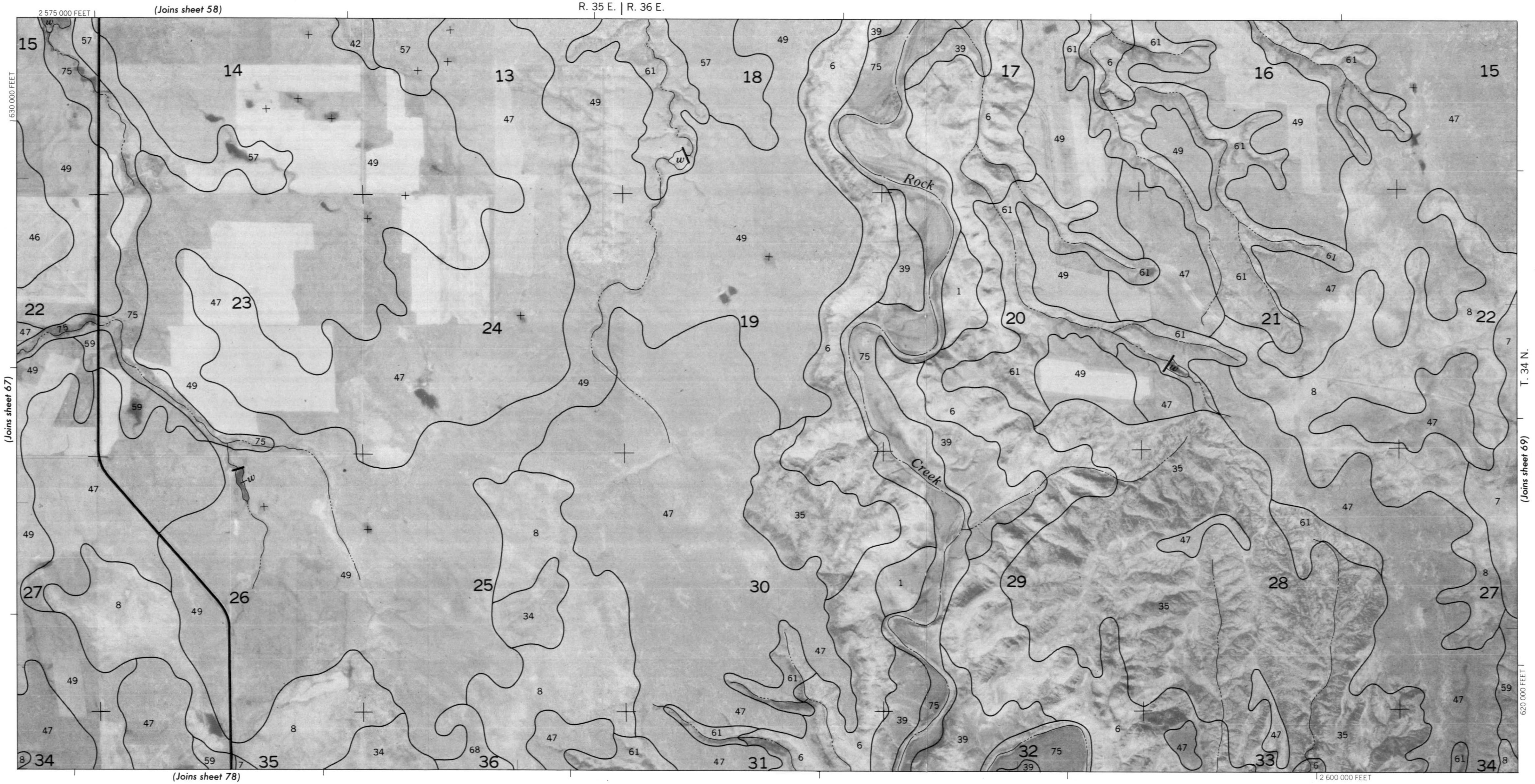
VALLEY COUNTY, MONTANA NO. 67

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 68



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

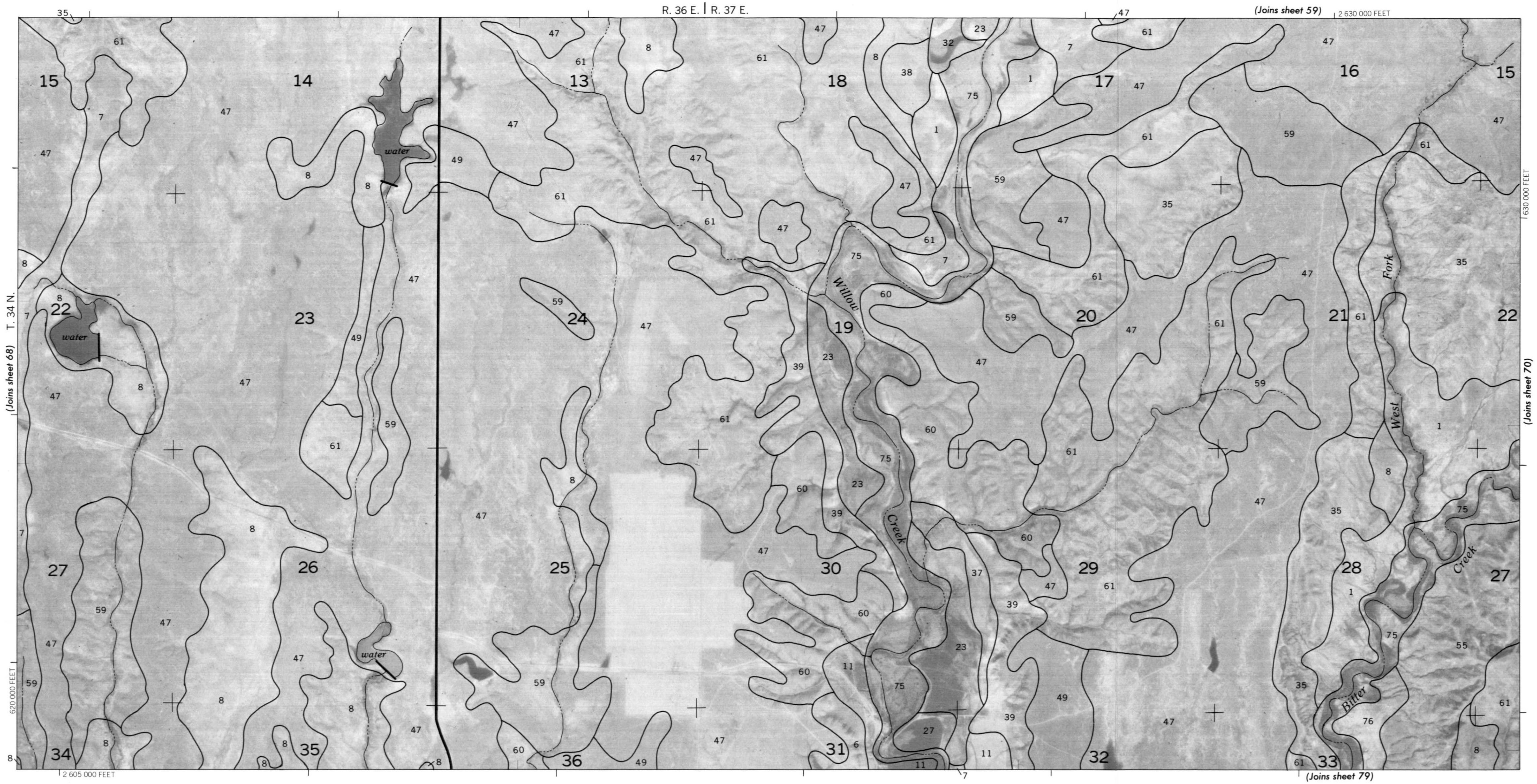
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 68

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

VALLEY COUNTY, MONTANA — SHEET NUMBER 70

70

N

1 ¾ ½ ¼ 0 1 2 Miles

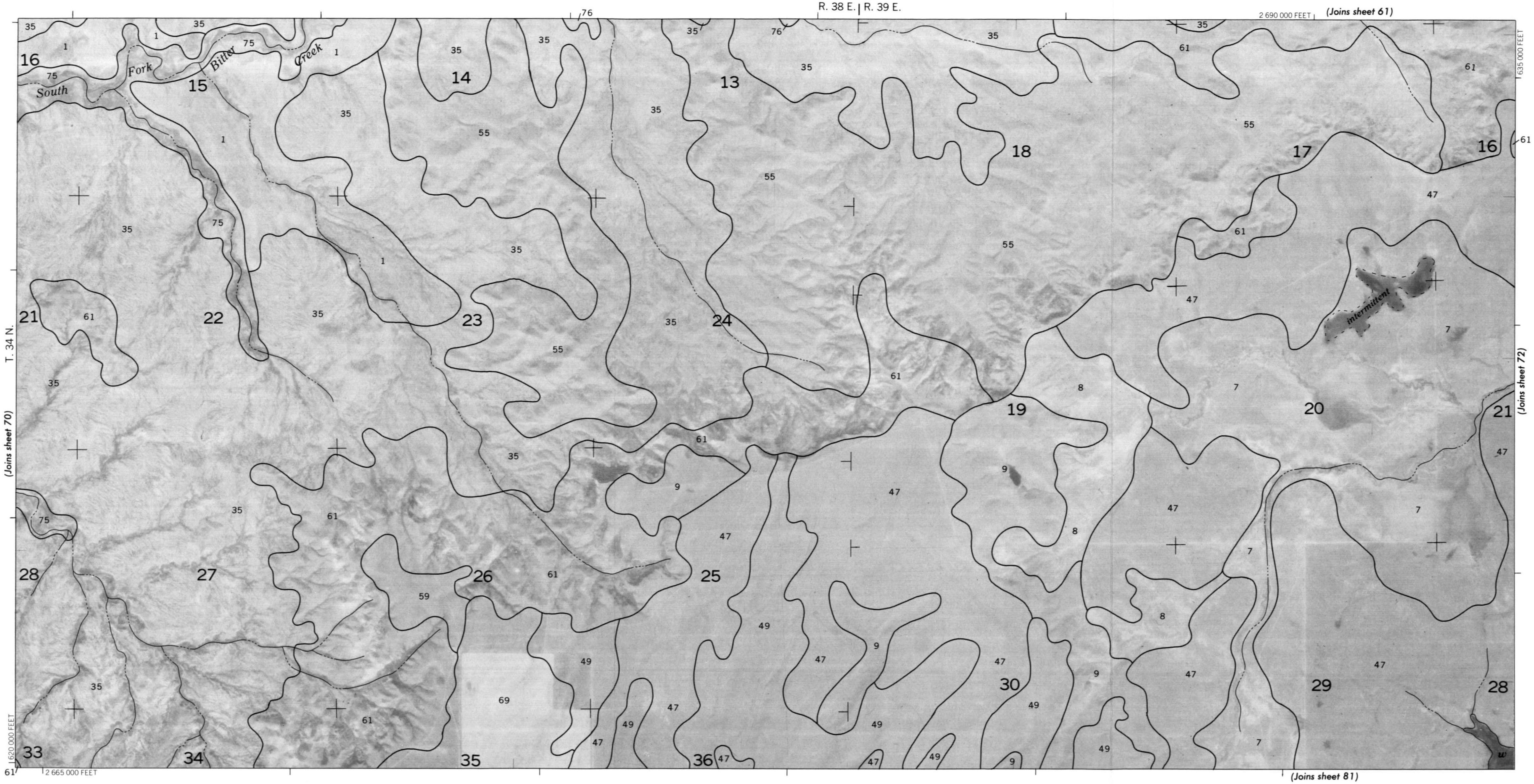
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



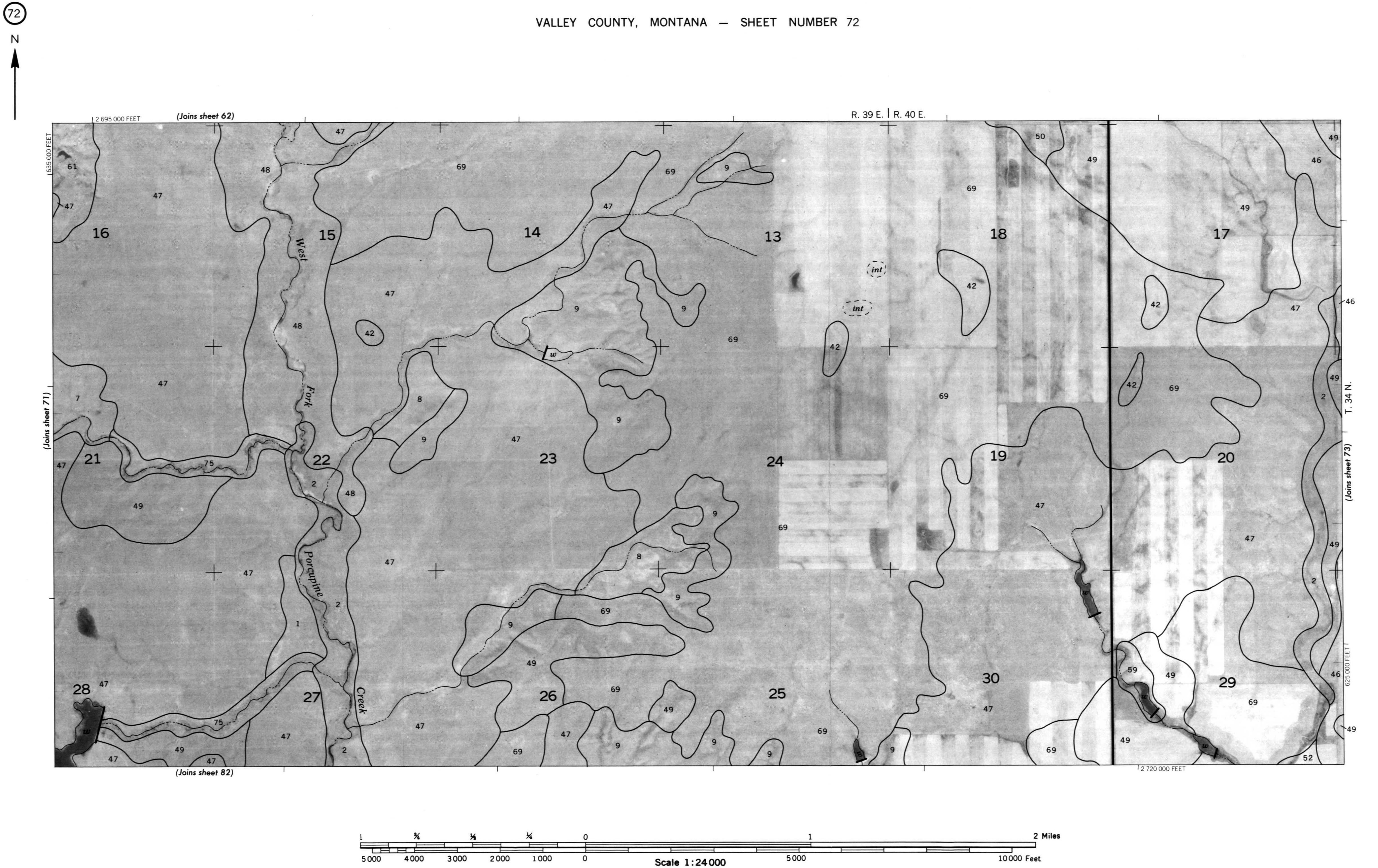
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 72

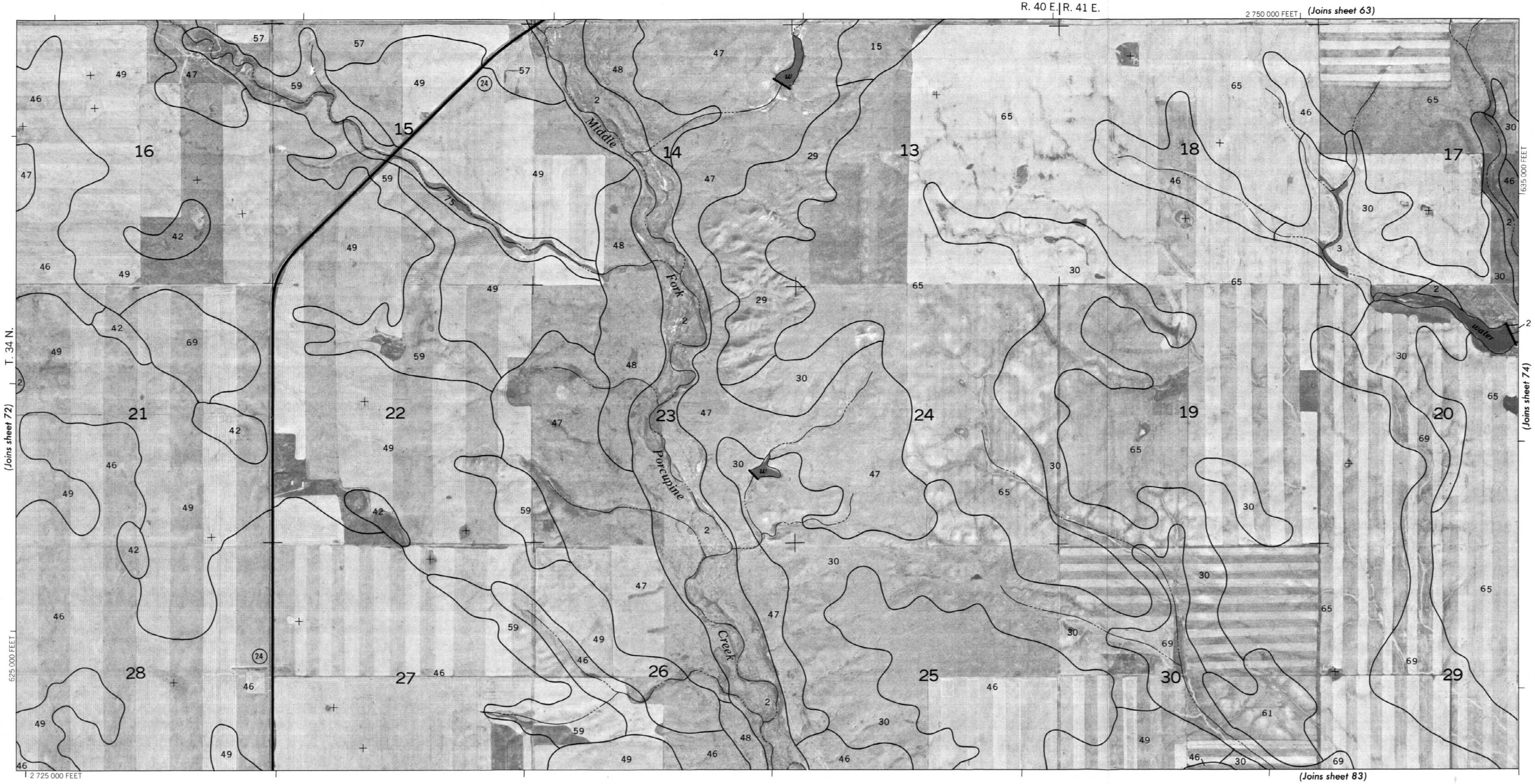


5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 72

N

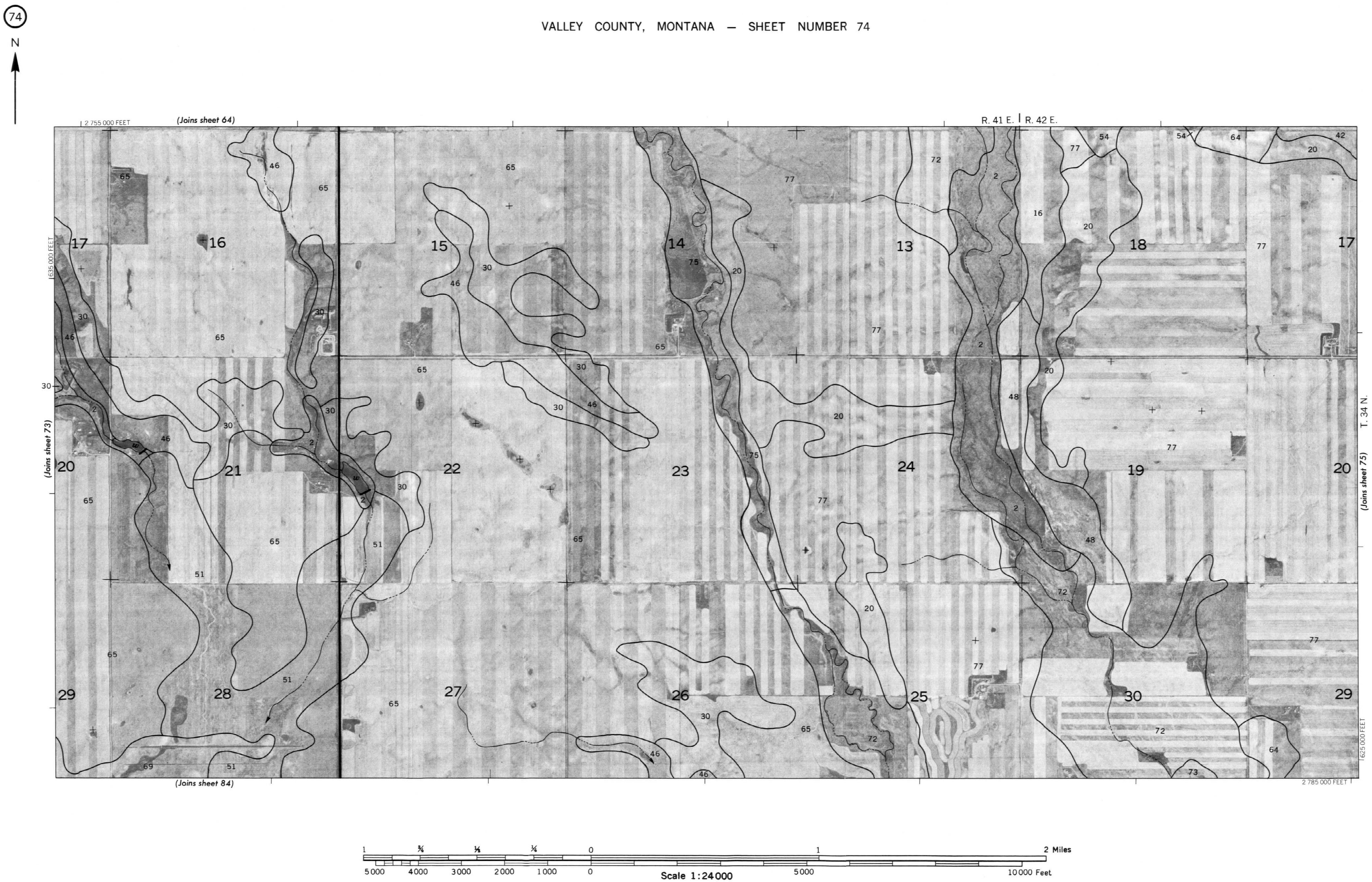


1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 73

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 74



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 74

75

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

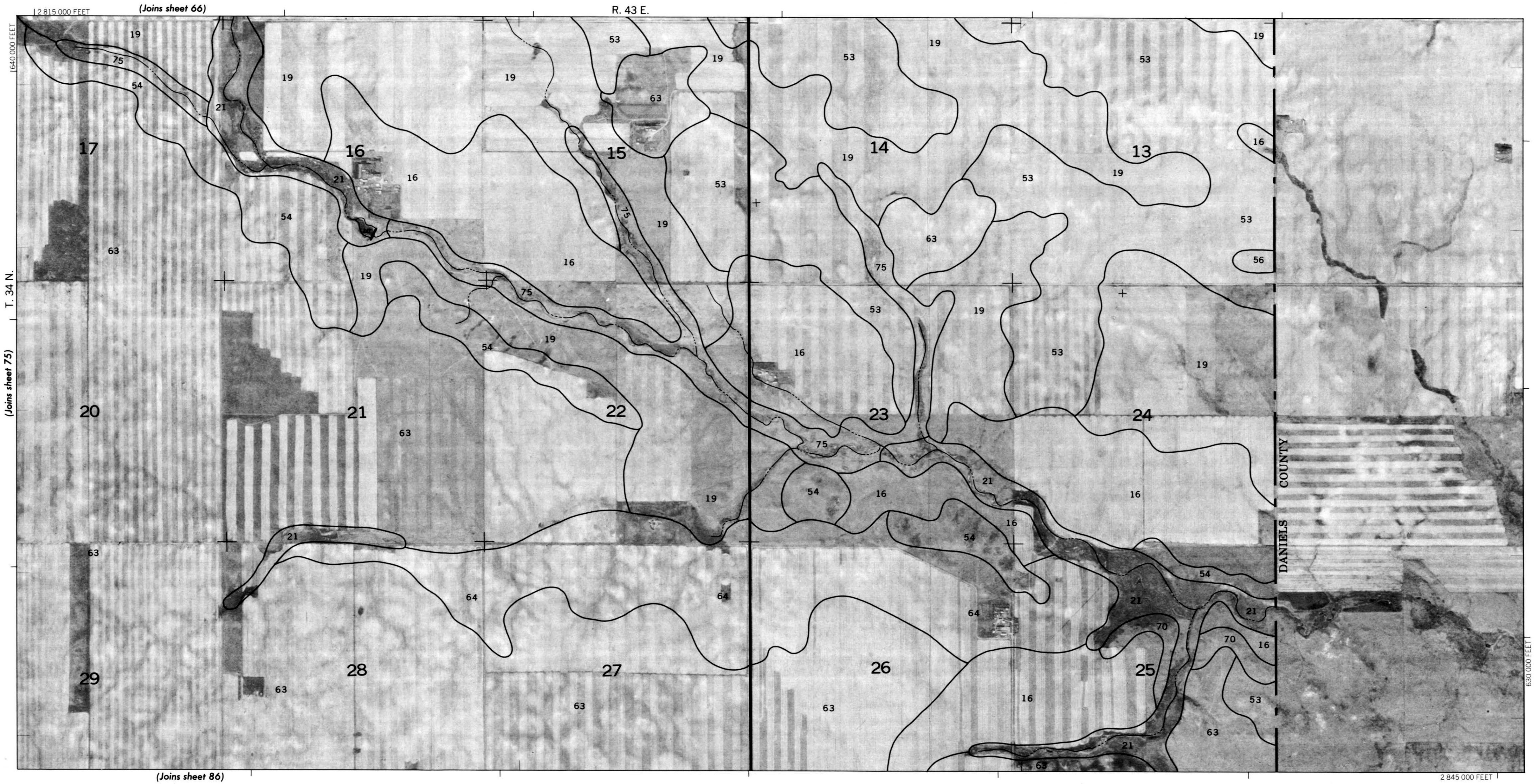
VALLEY COUNTY, MONTANA NO. 75

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

VALLEY COUNTY, MONTANA — SHEET NUMBER 76

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

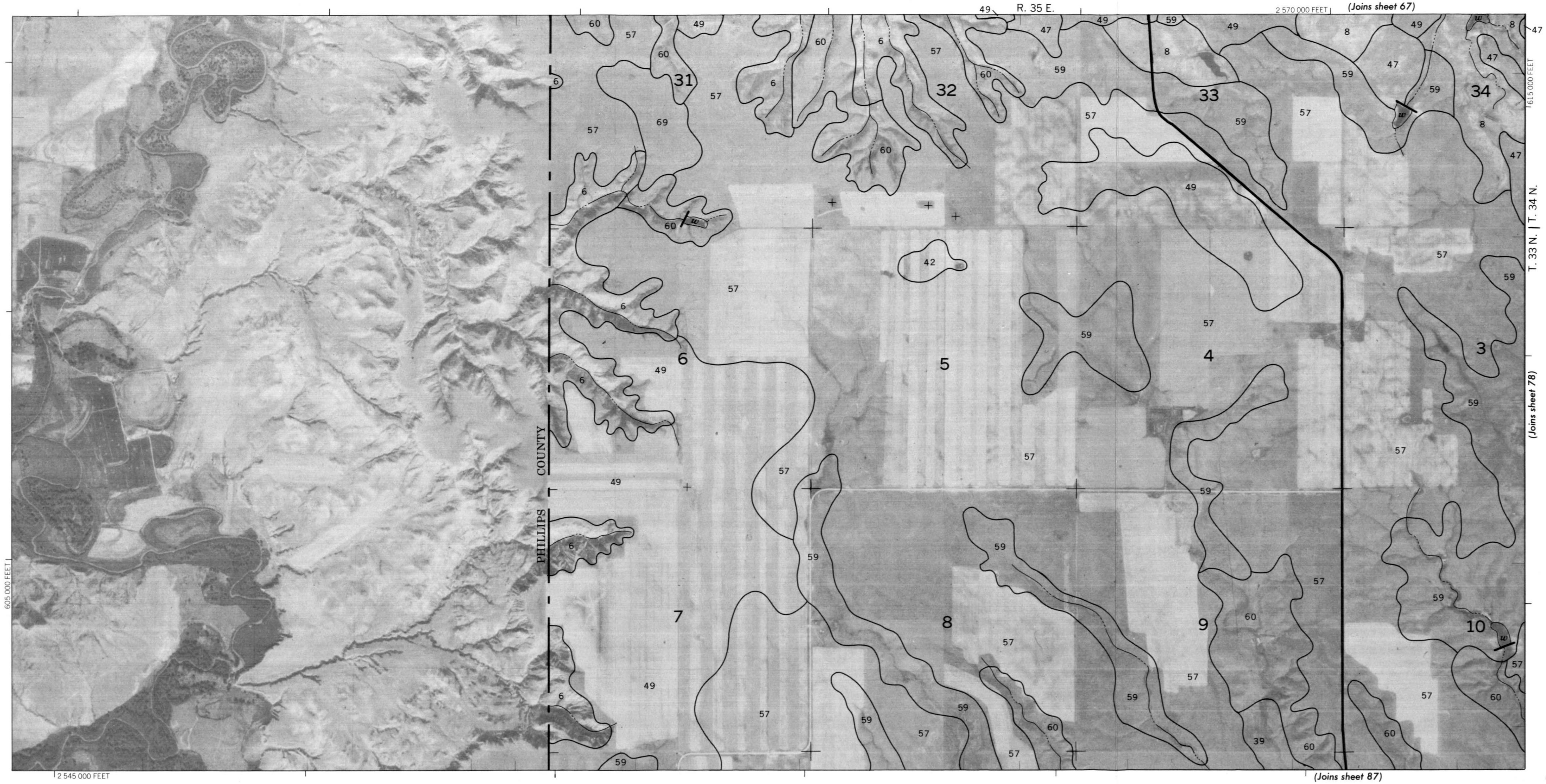
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 76

77

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

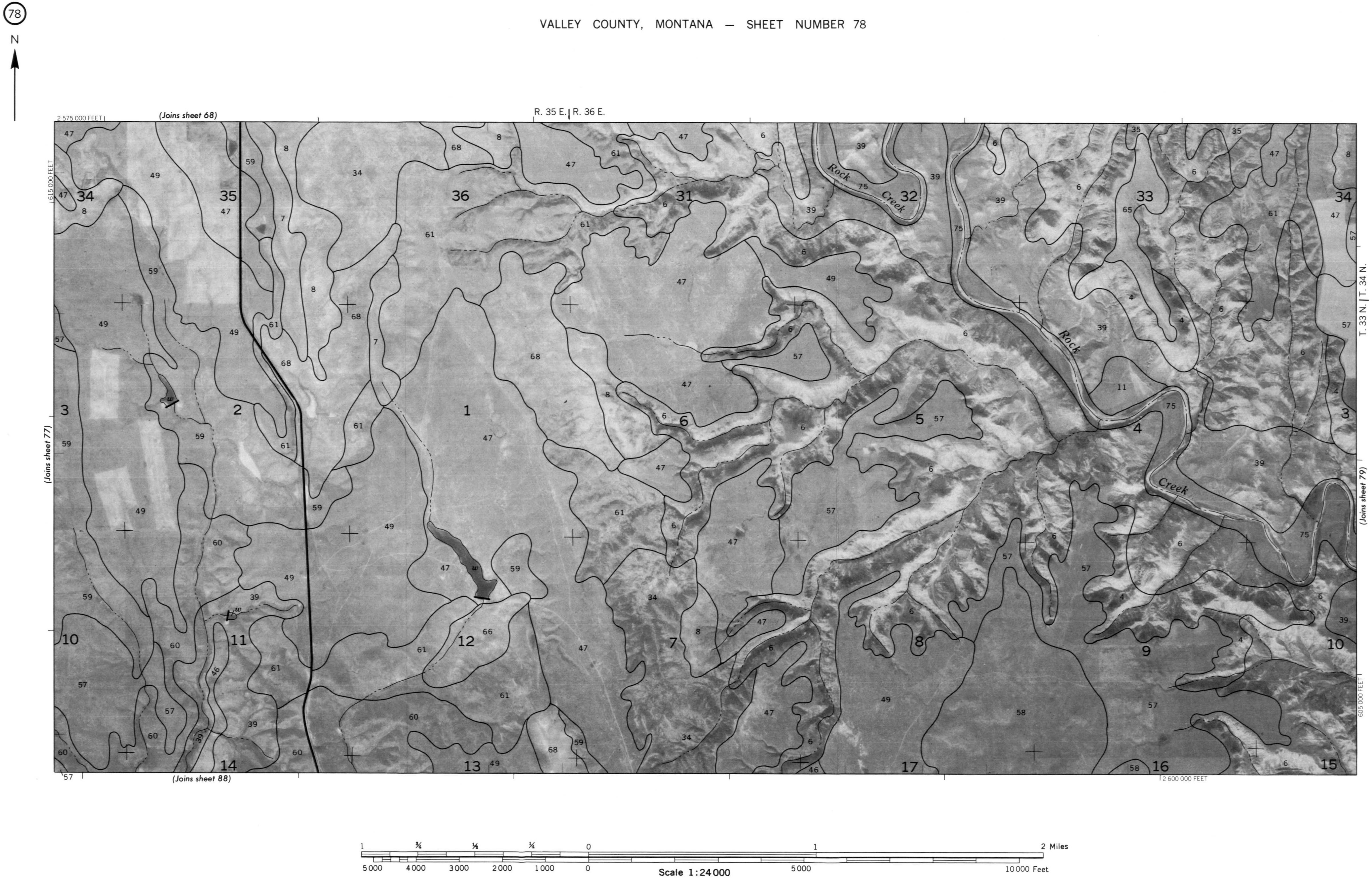
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 77

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

VALLEY COUNTY, MONTANA — SHEET NUMBER 78

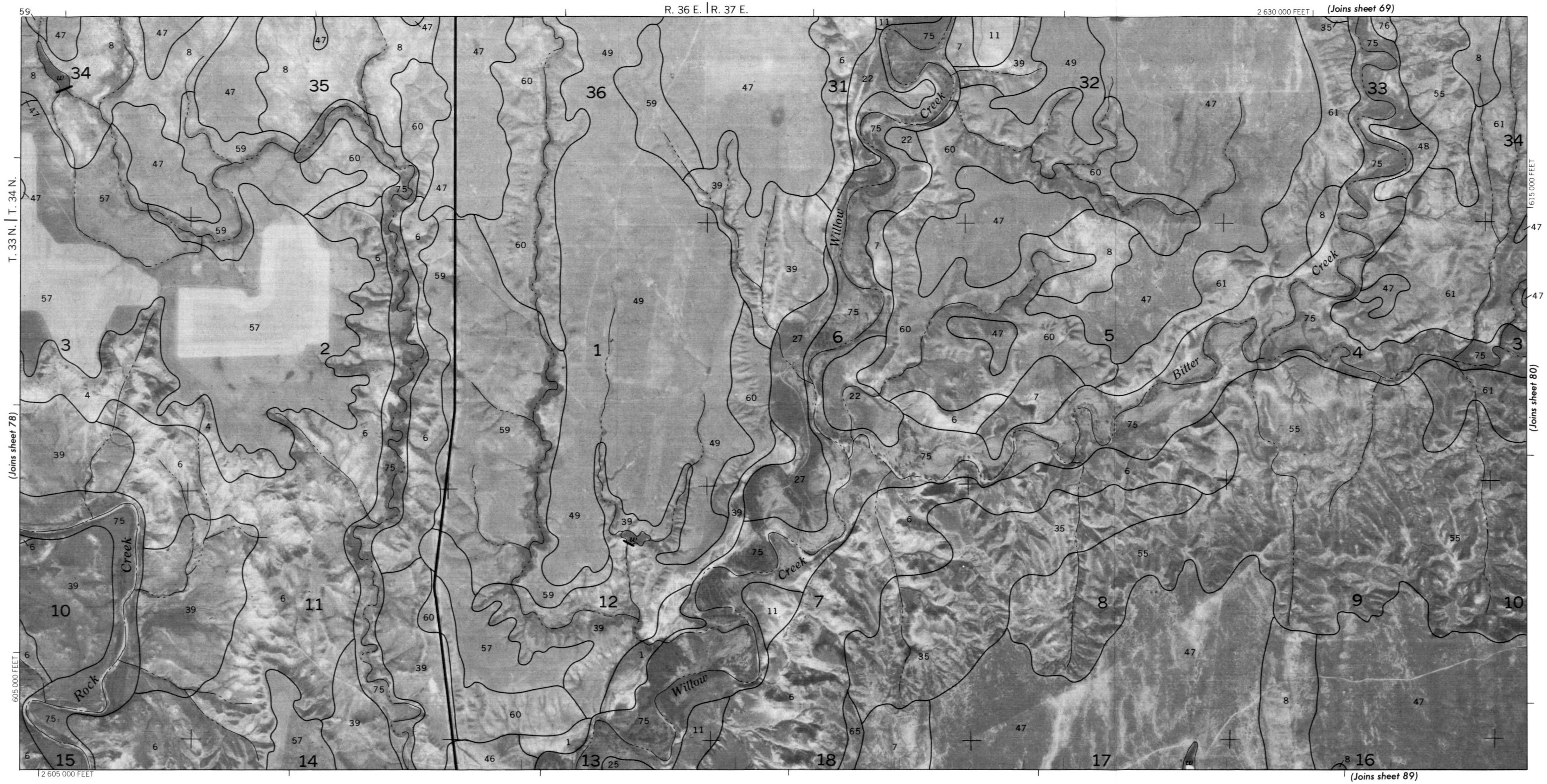


5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

79

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

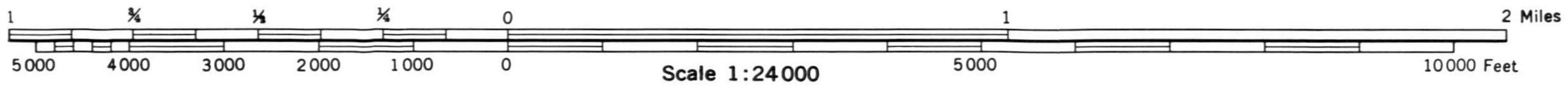
Scale 1:24000

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

80

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 80



5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

VALLEY COUNTY, MONTANA NO. 80

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

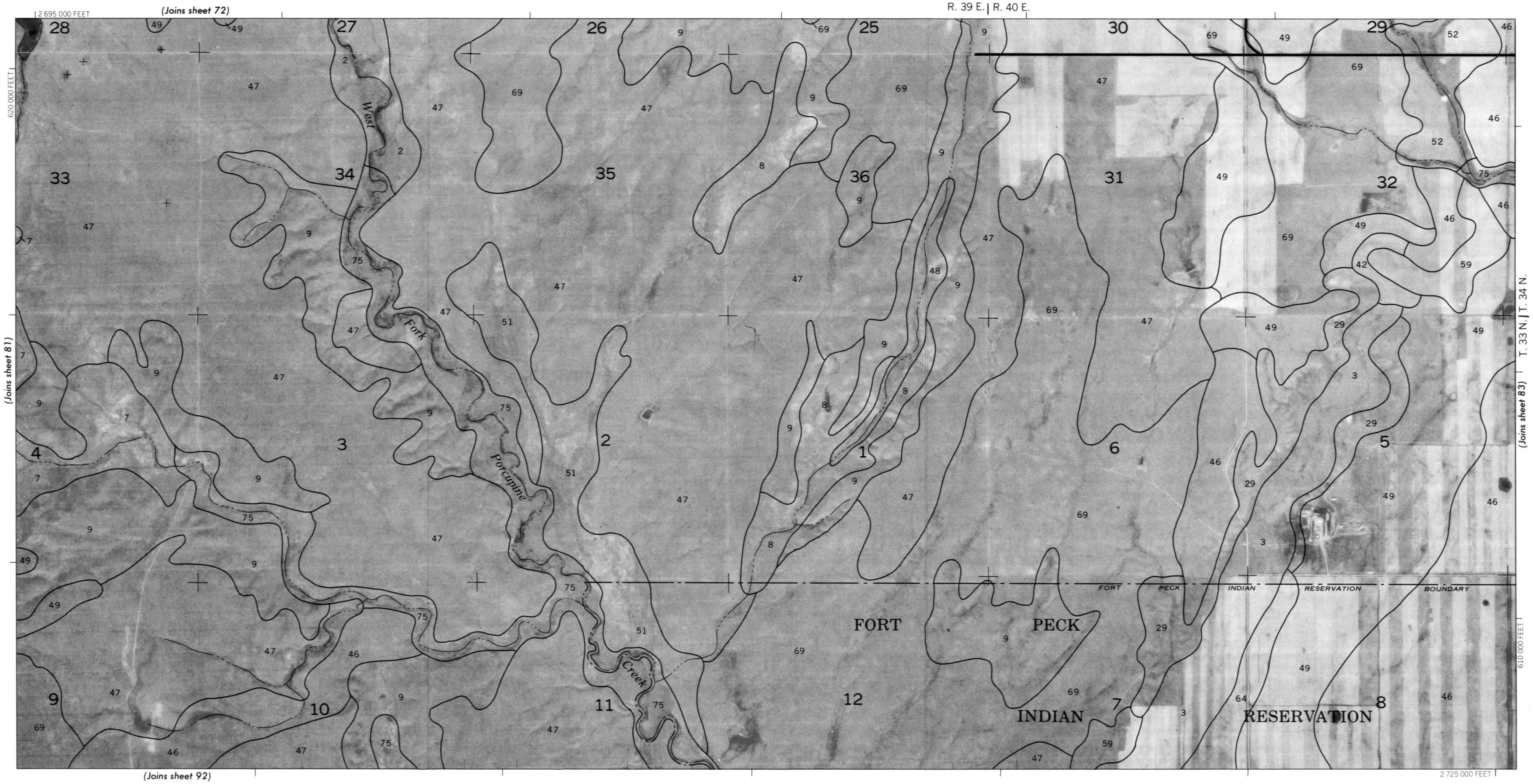
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 81

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 82



1 ¾ ½ ¼ 0 1 2 Miles

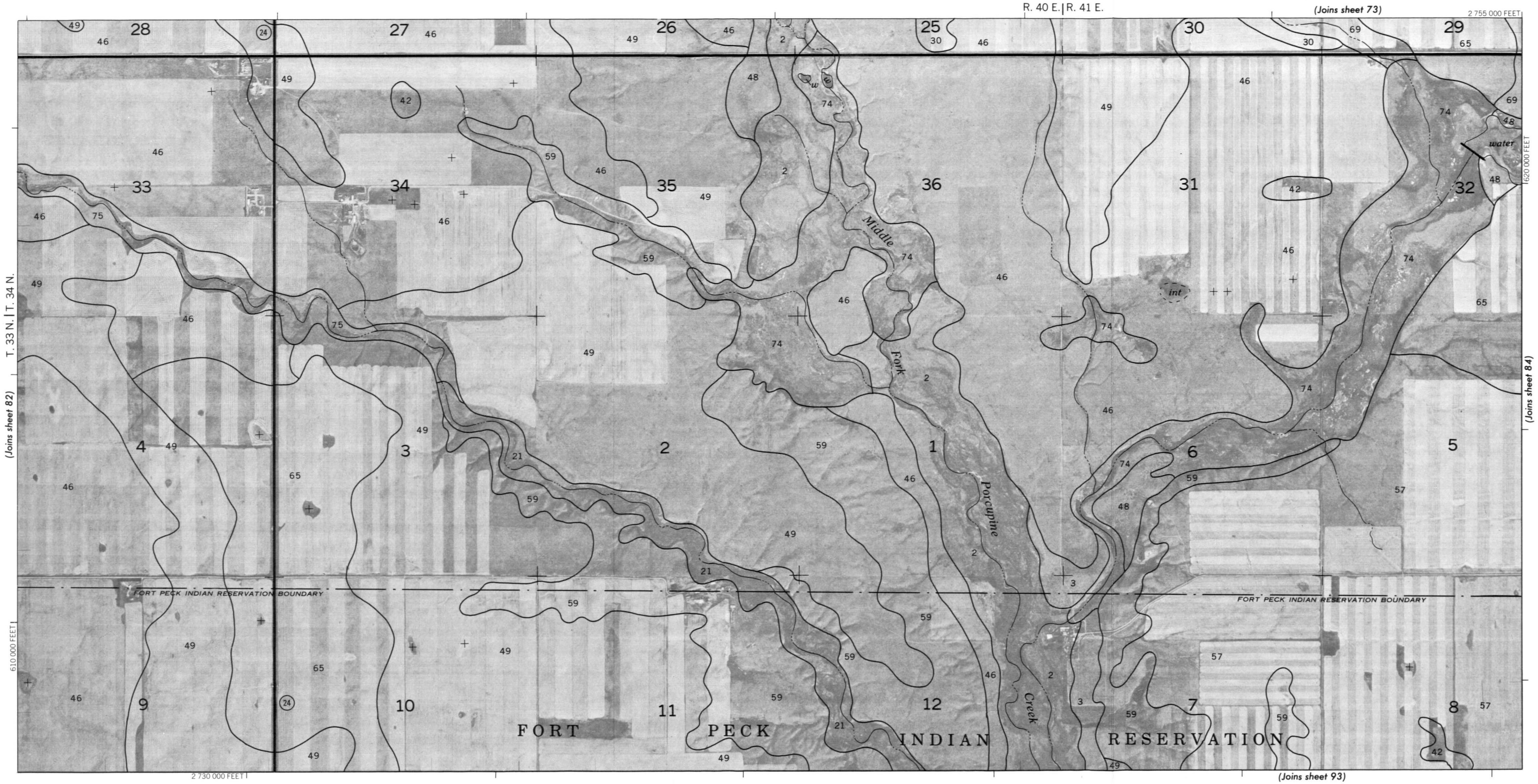
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5 000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

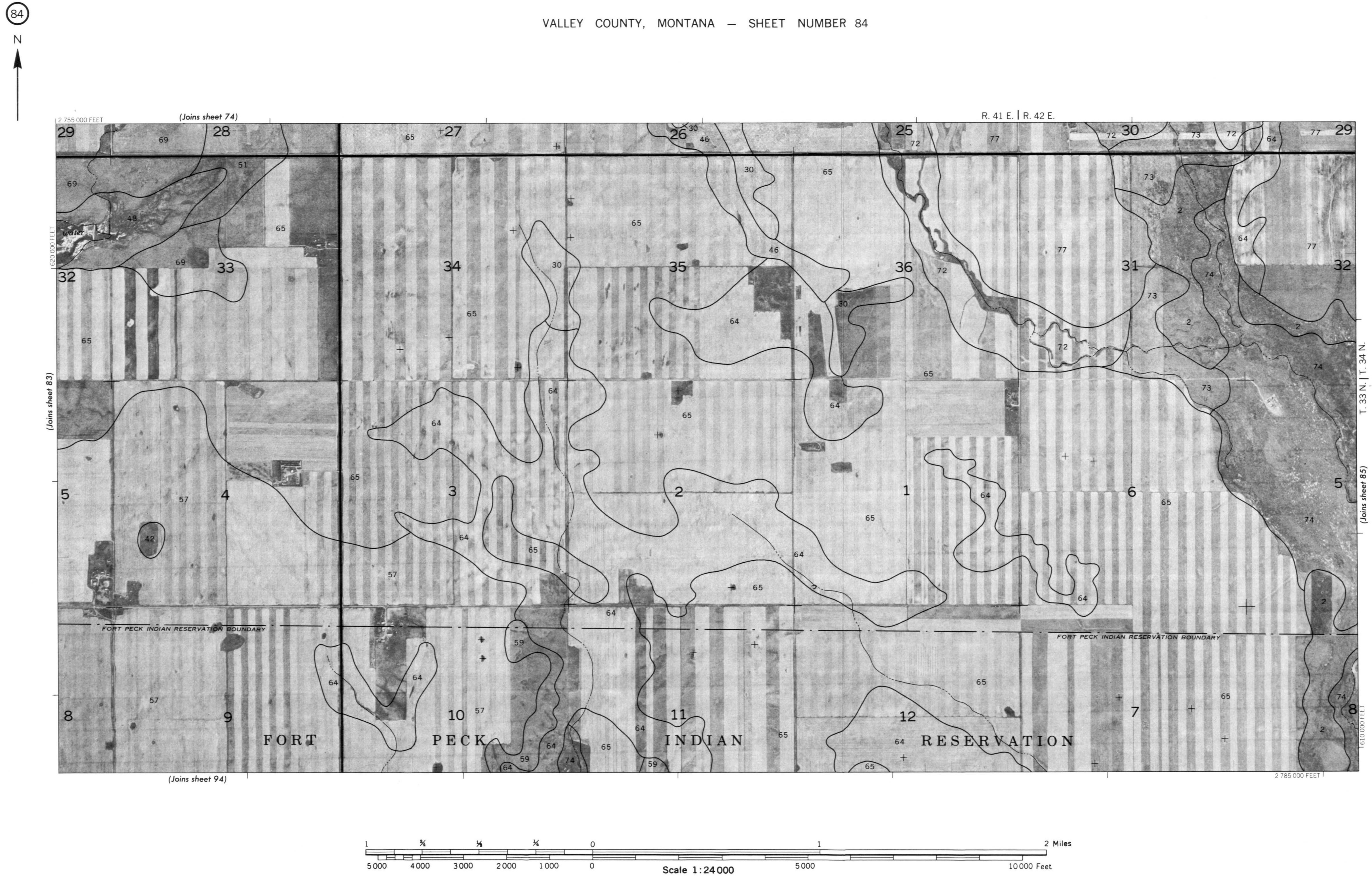
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 83

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

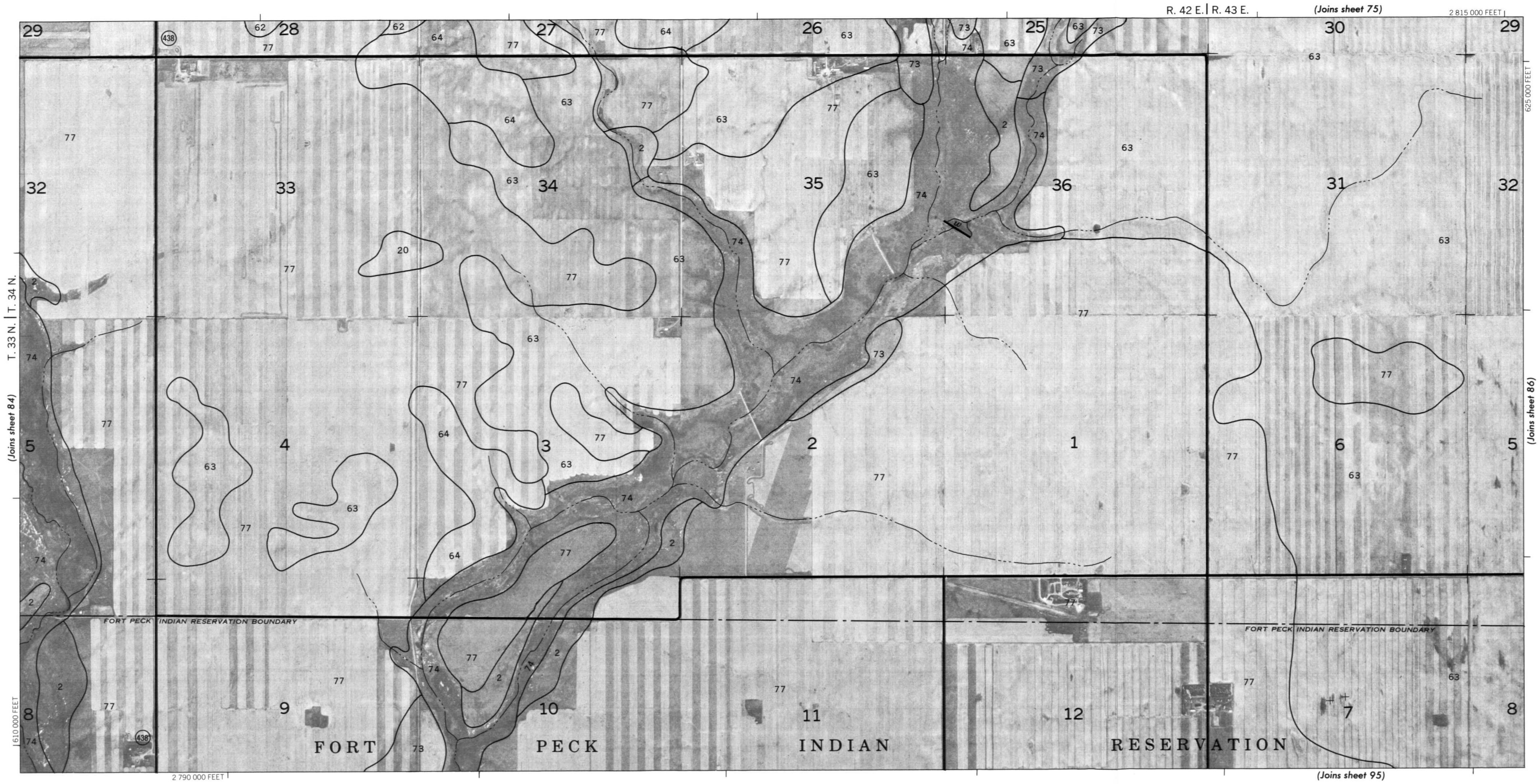
VALLEY COUNTY, MONTANA — SHEET NUMBER 84



5 000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

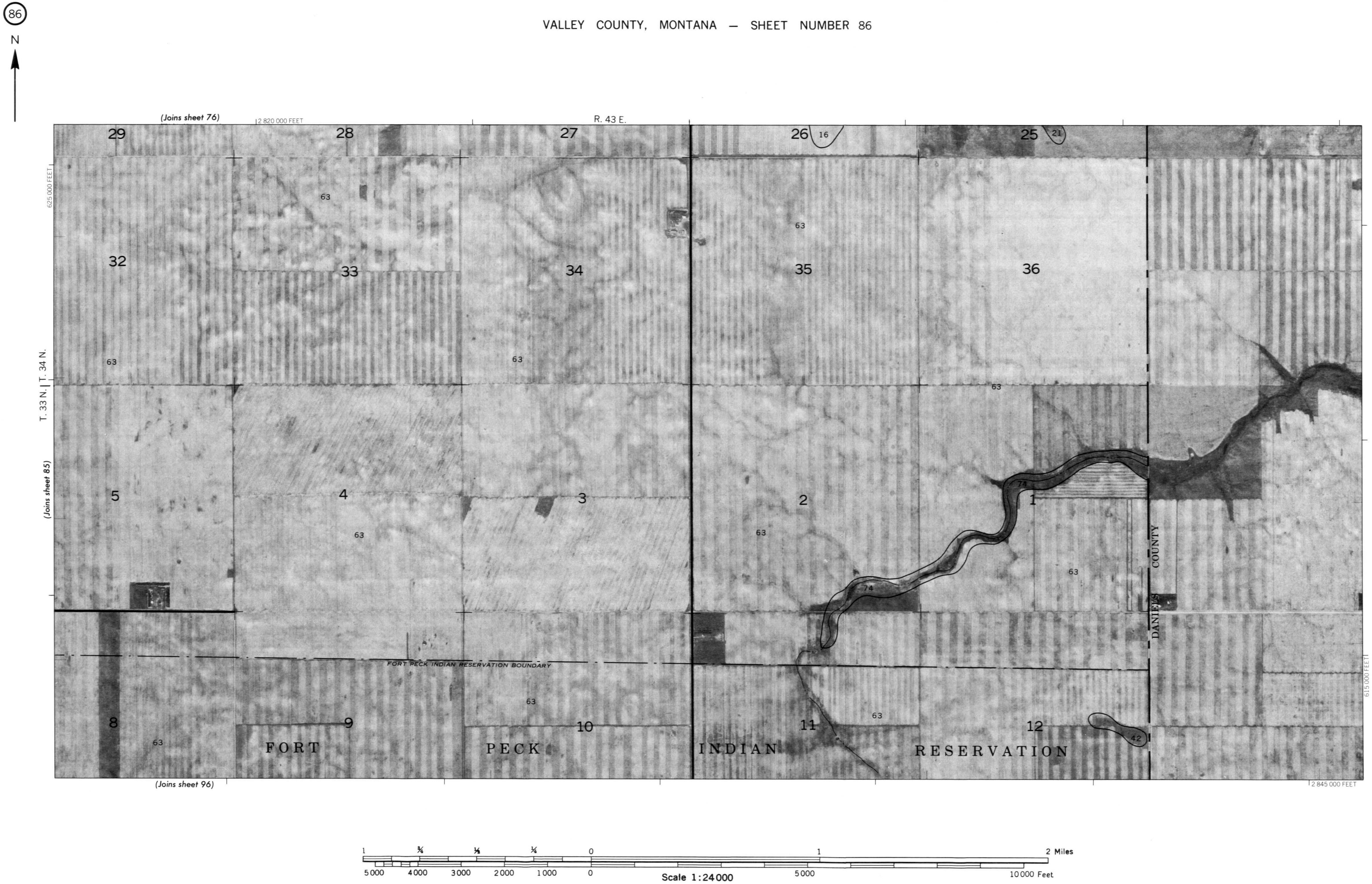
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map was compiled on 1974 1975 and 1976 U S Department of The Interior Geological Survey orthophotography by the U S Department of Agriculture, Soil Conservation Service and cooperating agencies

5 000 foot grid ticks based on state coordinate system Land division corners, if shown, are approximately positioned

VALLEY COUNTY, MONTANA — SHEET NUMBER 86



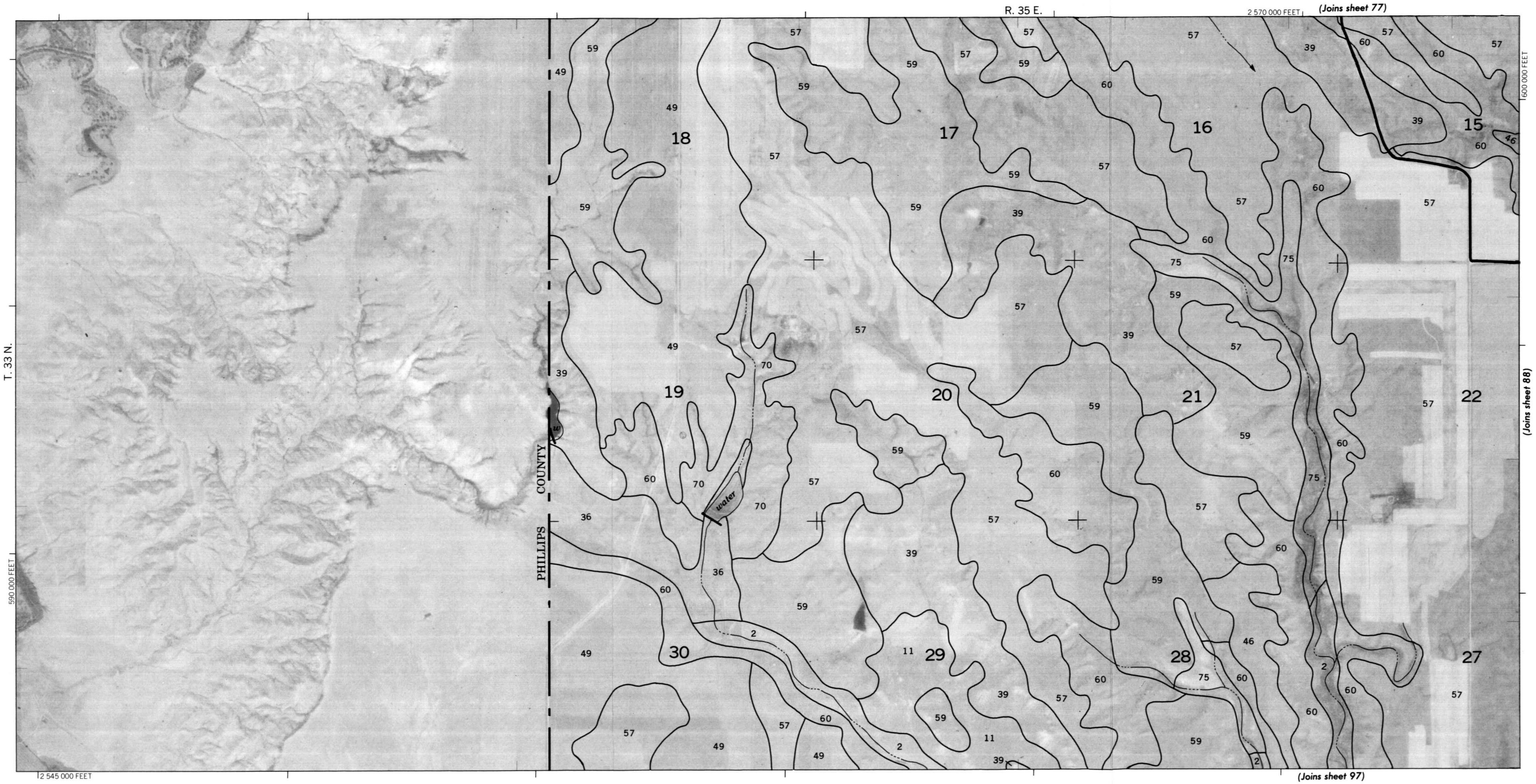
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA NO. 87

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



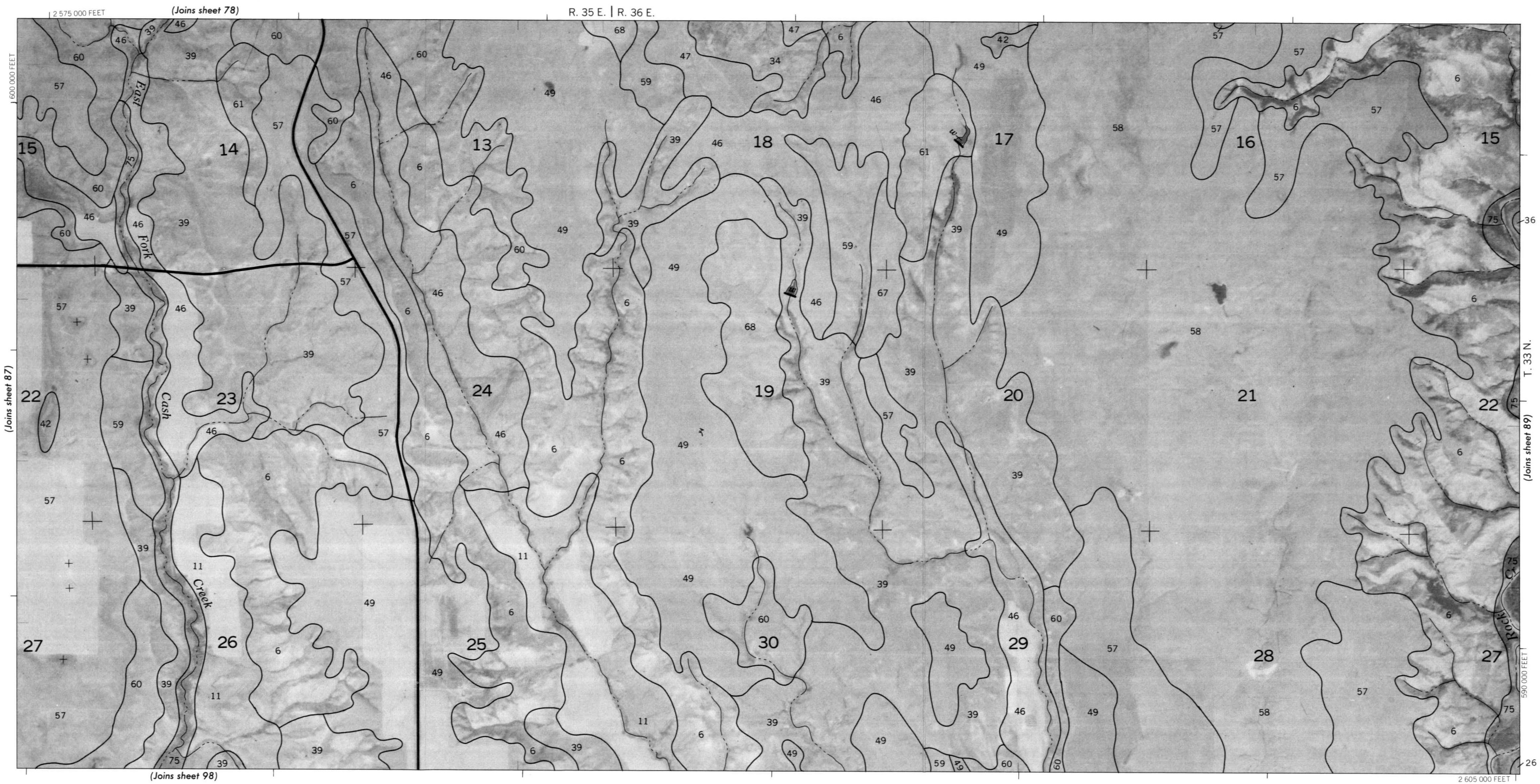
Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 88



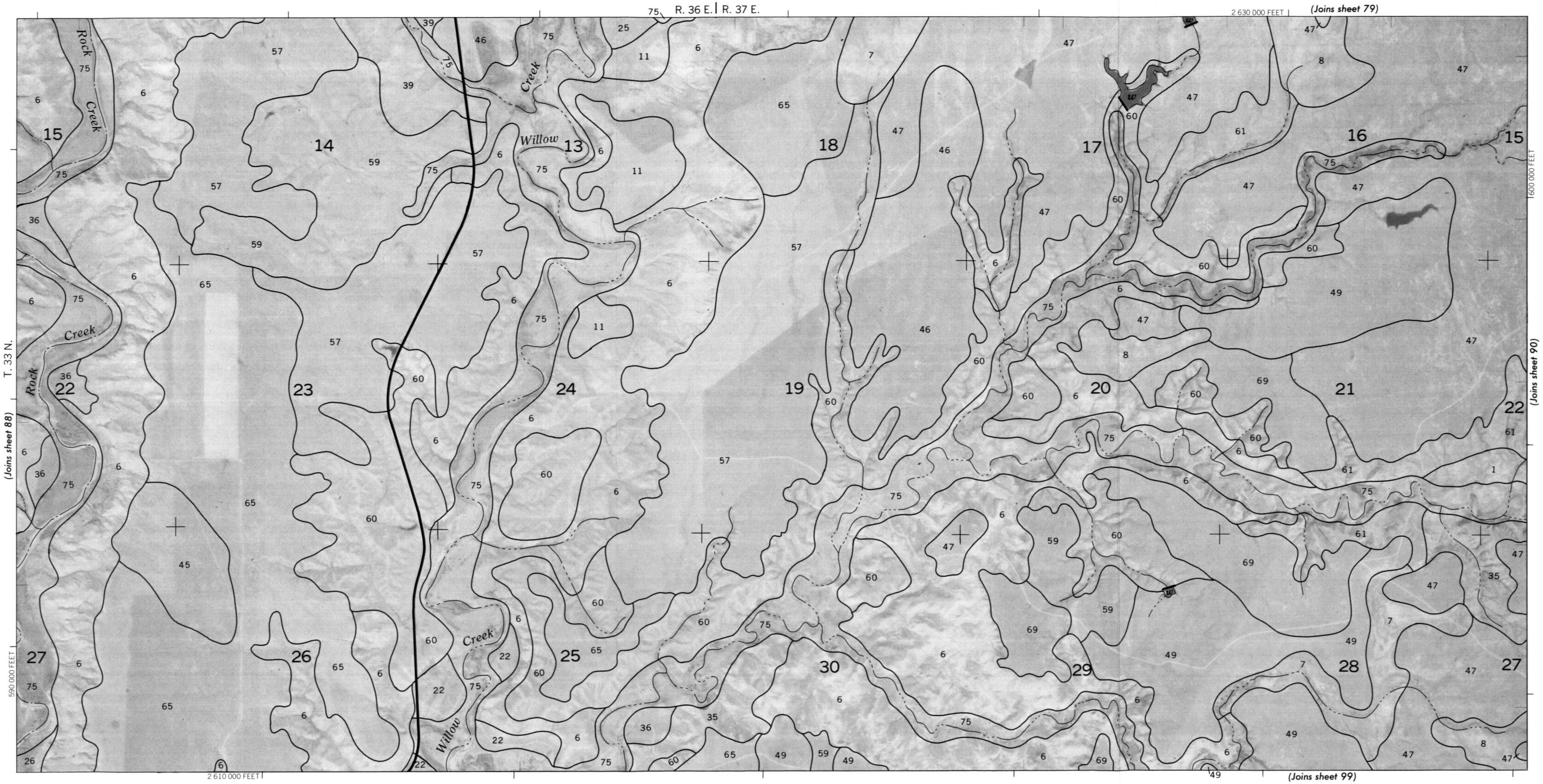
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U S Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 88

N

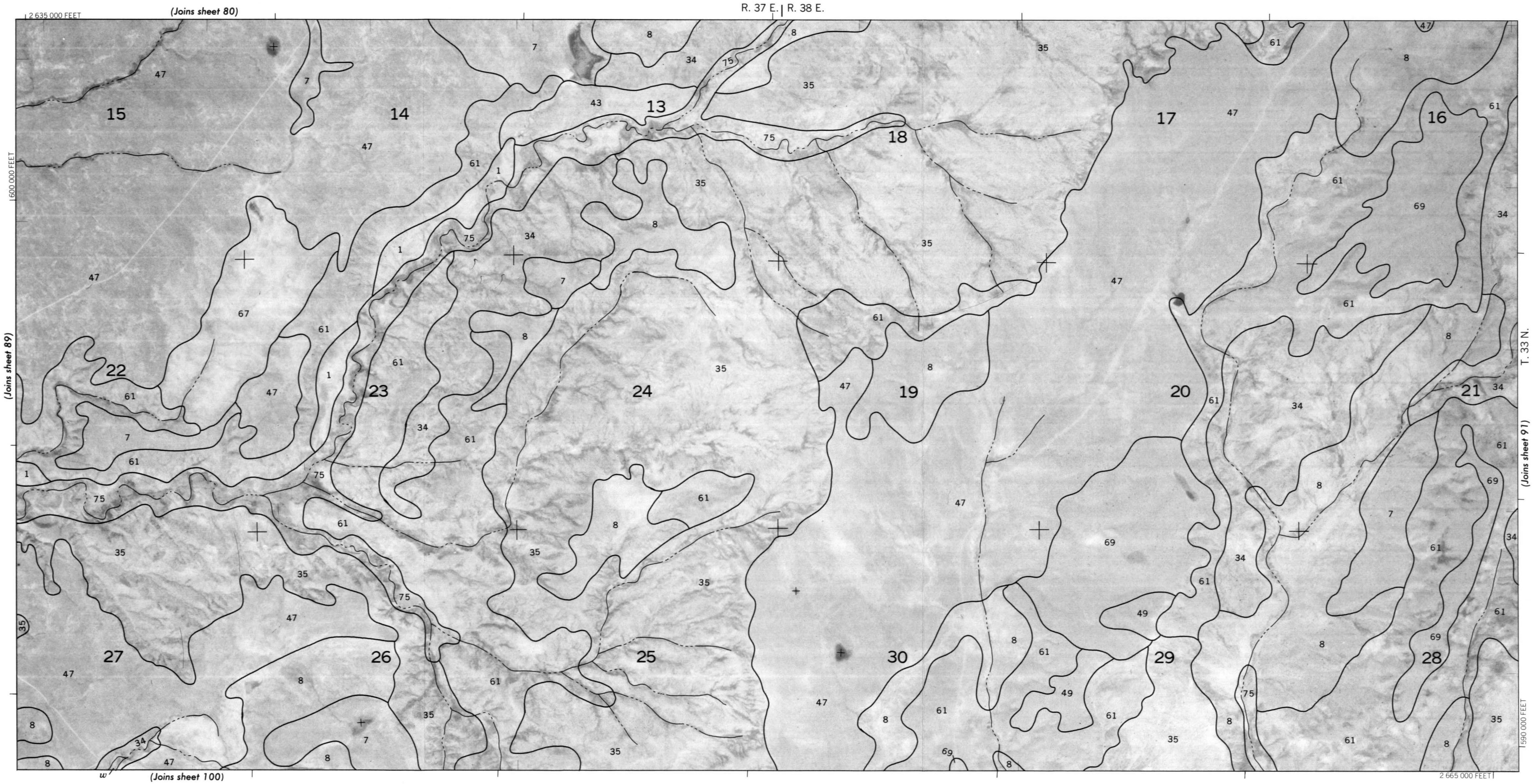


1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 90



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24 000

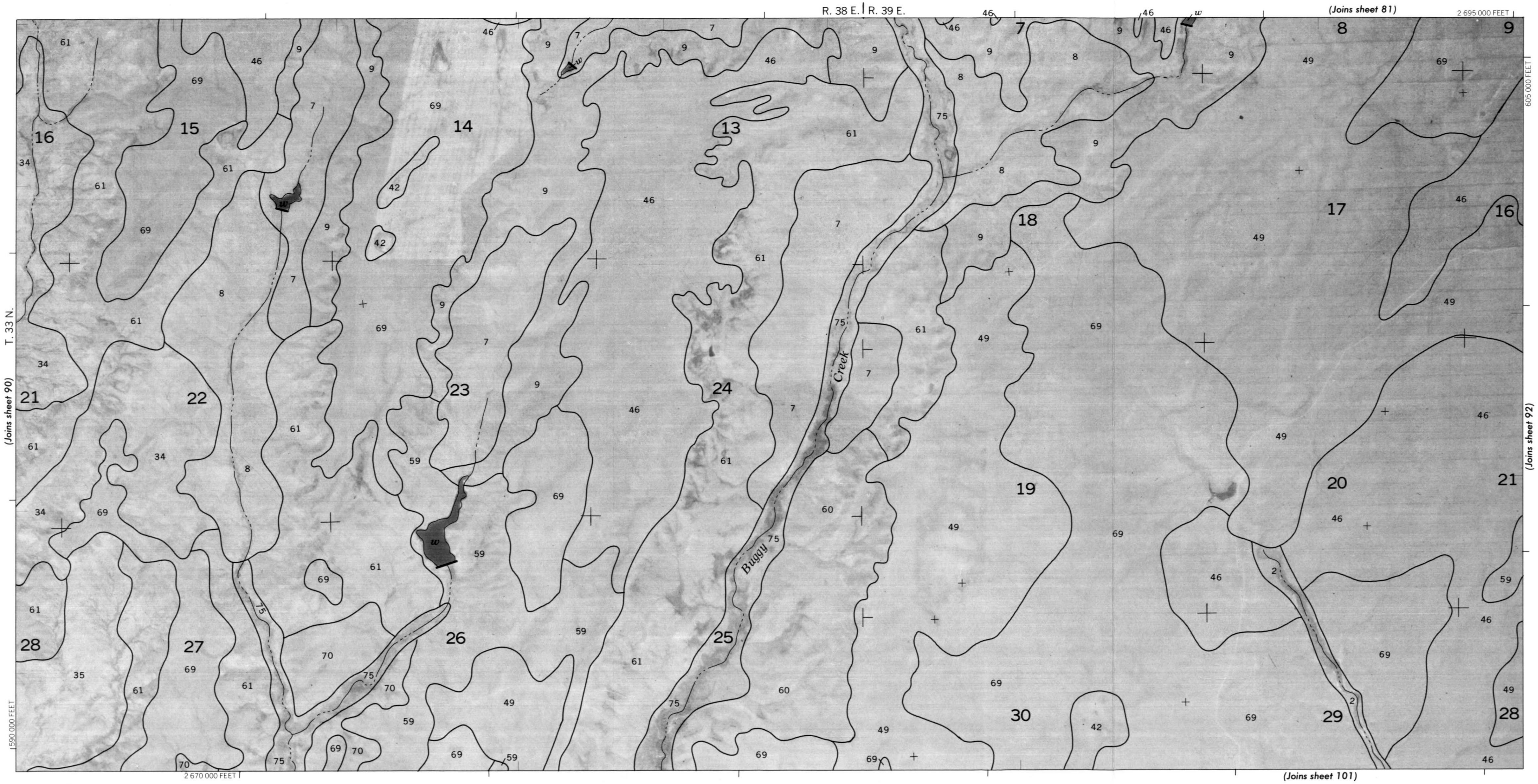
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 90

91

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

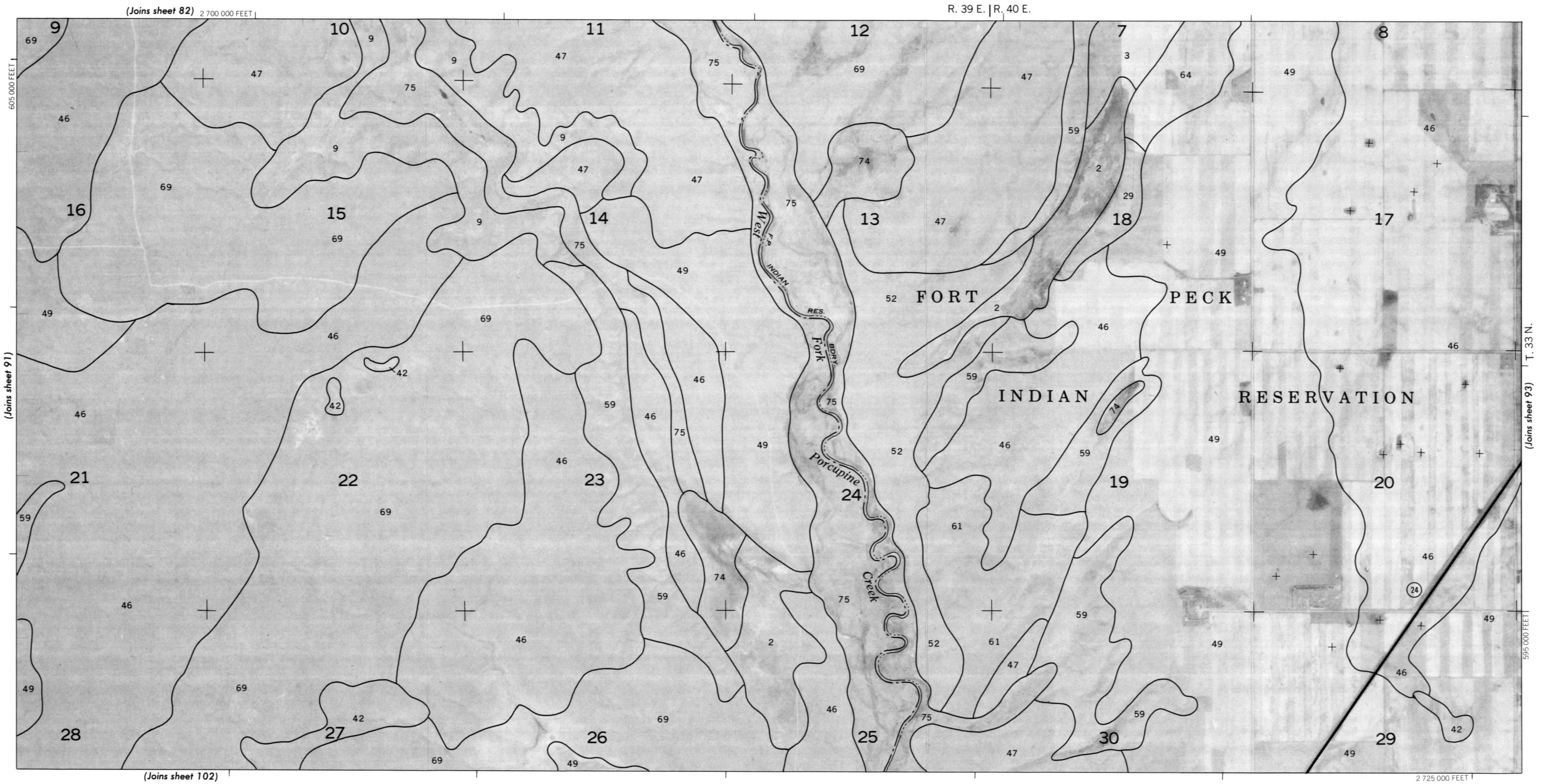
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 91

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 92

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

93

N

VALLEY COUNTY, MONTANA NO. 93

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

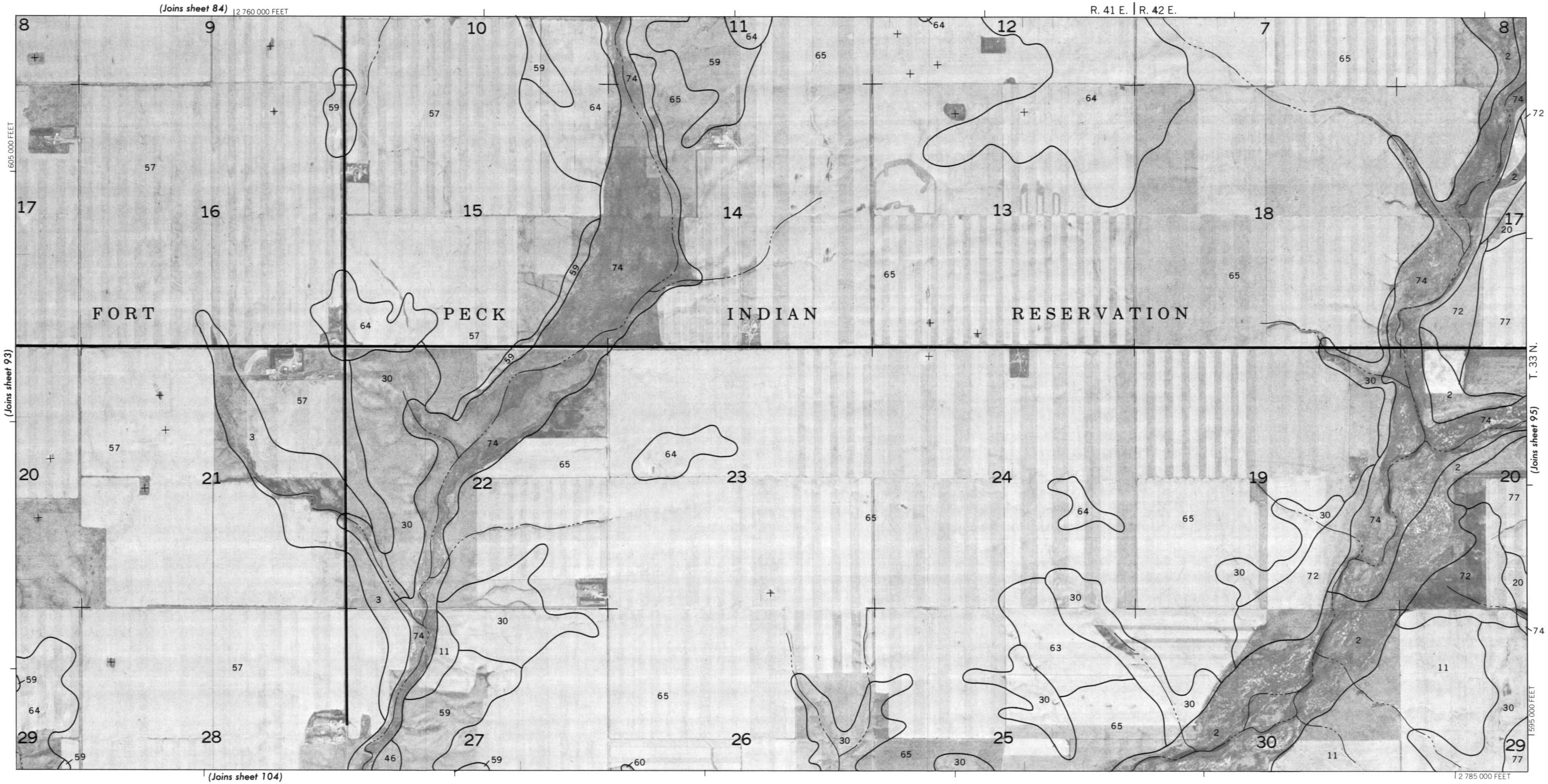
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

94

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 94



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

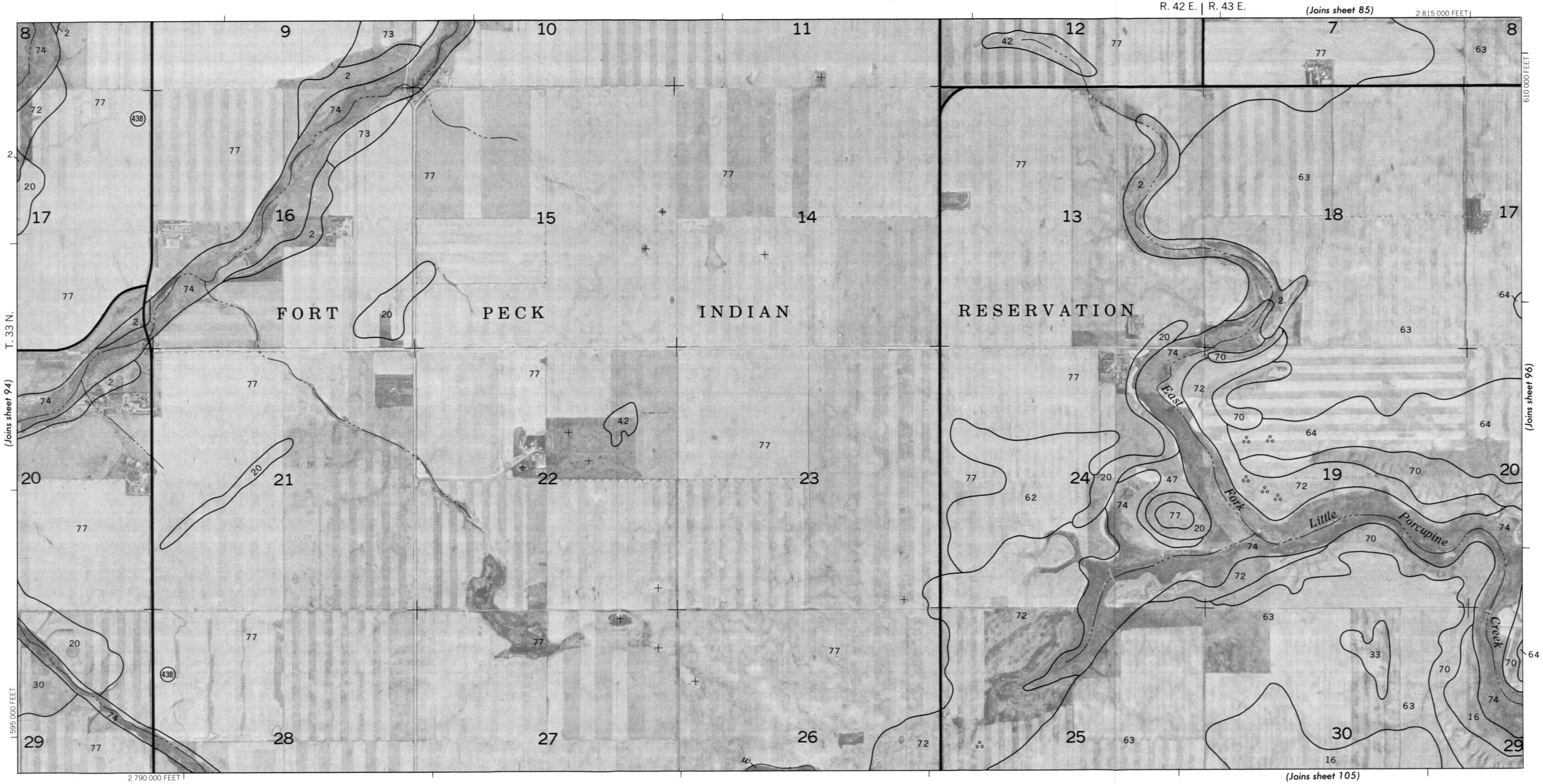
VALLEY COUNTY, MONTANA NO. 94

95

N

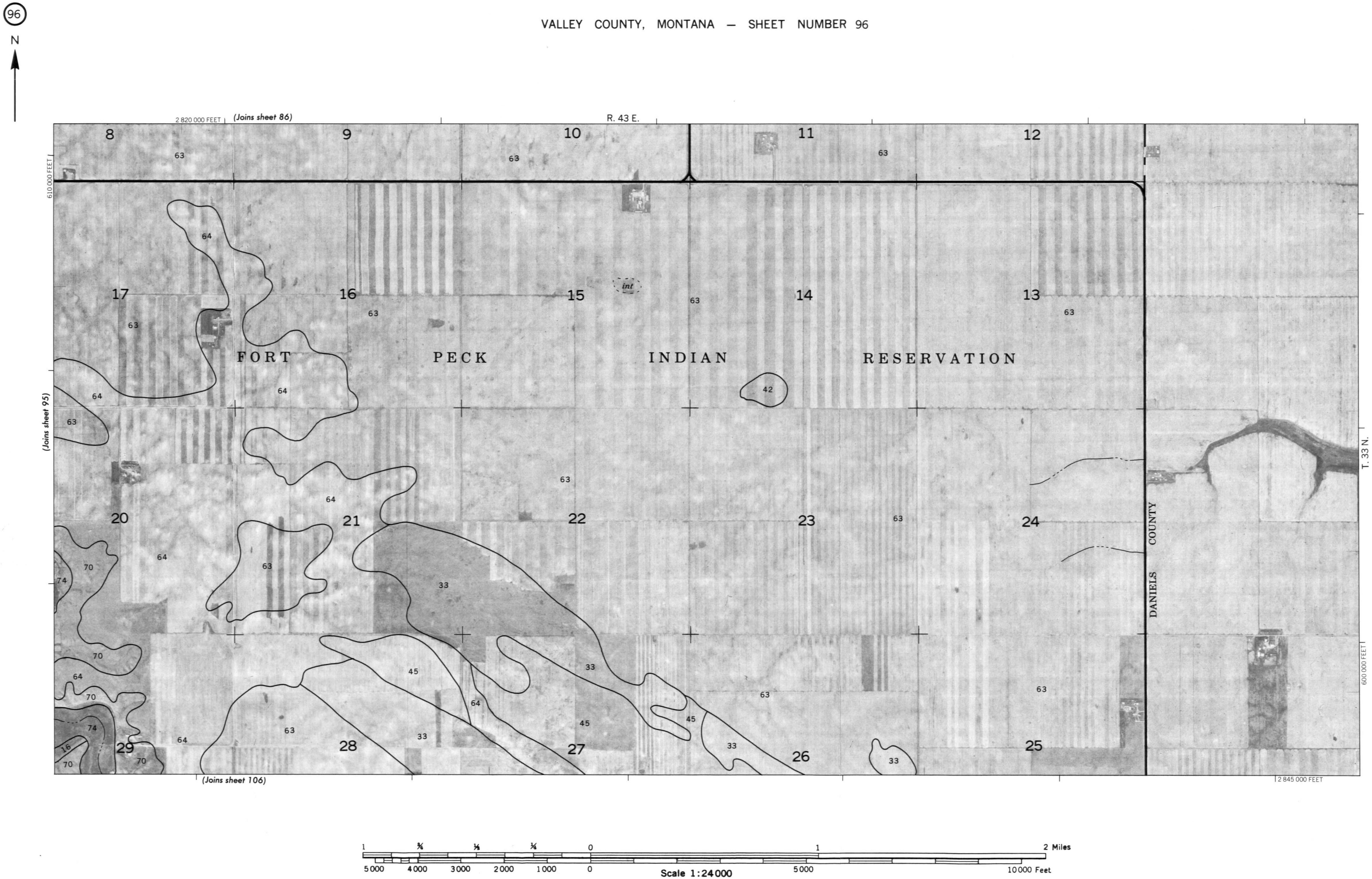
VALLEY COUNTY, MONTANA NO. 95

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 96



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

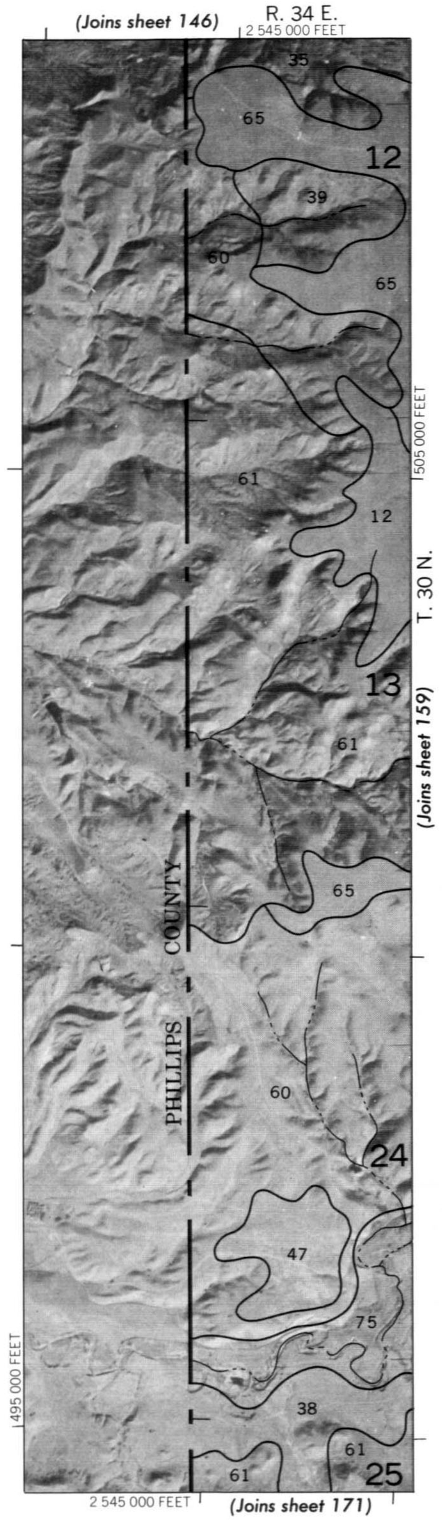
97

N

VALLEY COUNTY, MONTANA NO. 97

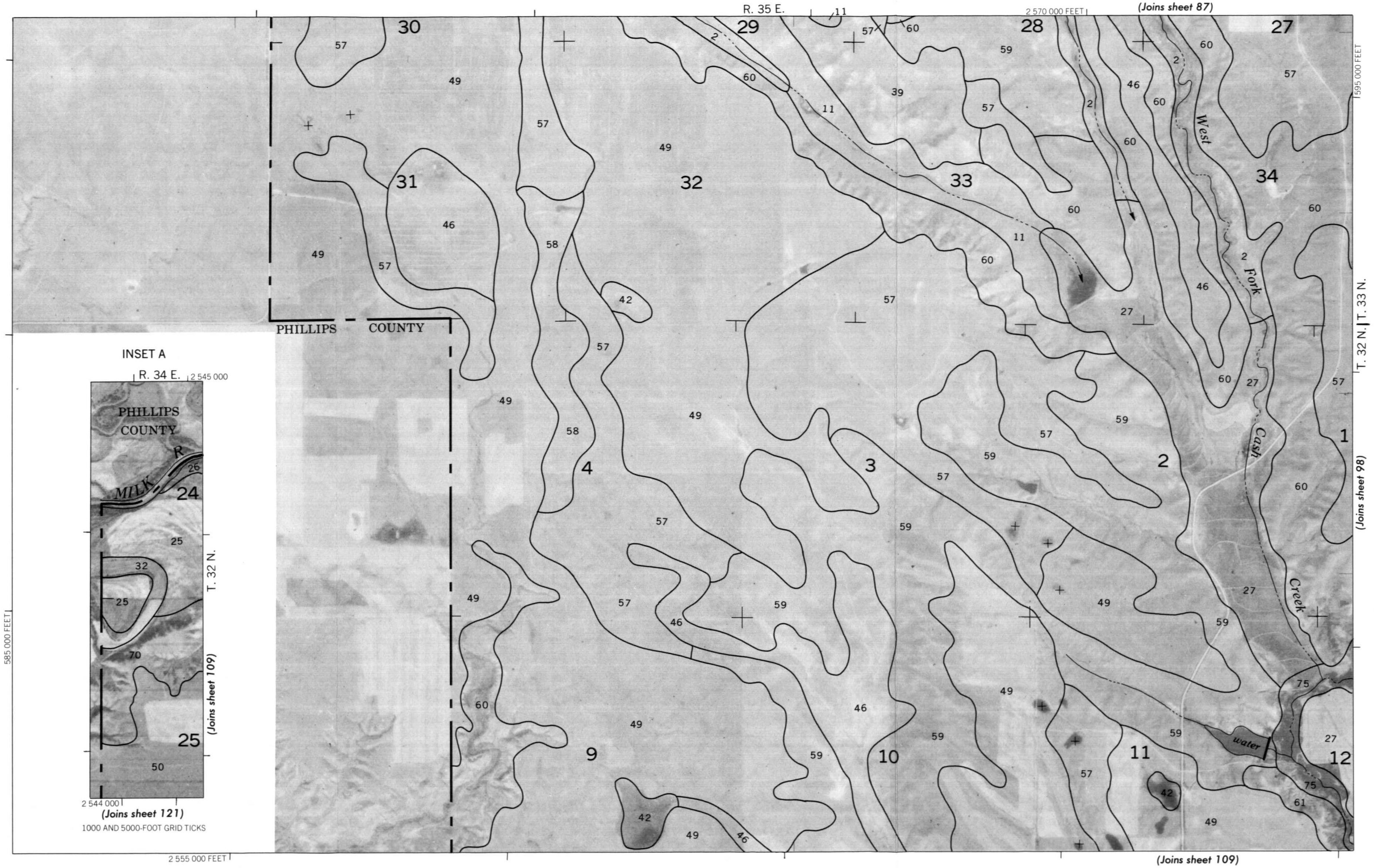
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



2000 AND 5000-FOOT GRID TICKS

INSET B



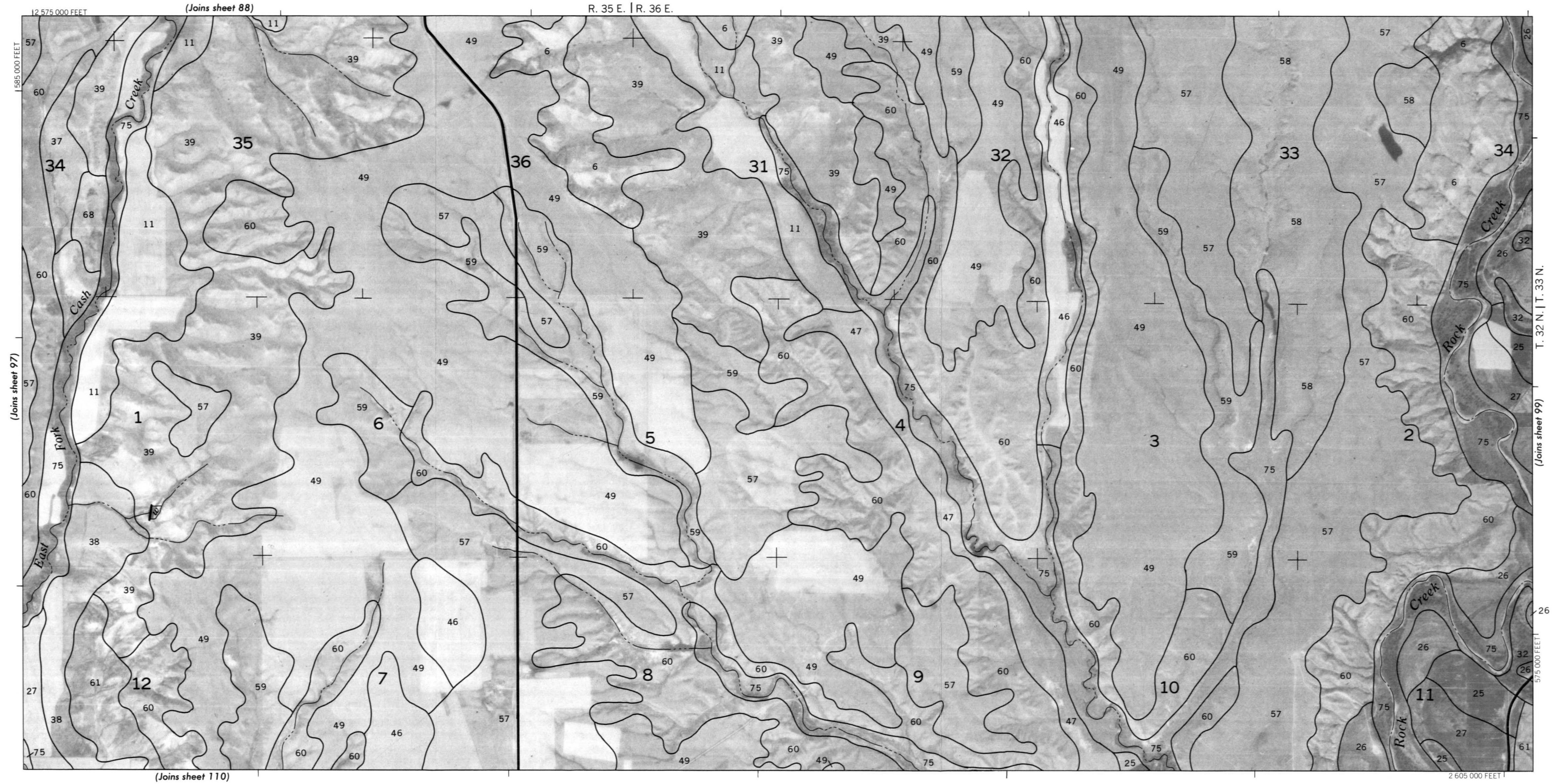
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 98

N



1 ¾ ½ ¼ 0 1 2 Miles

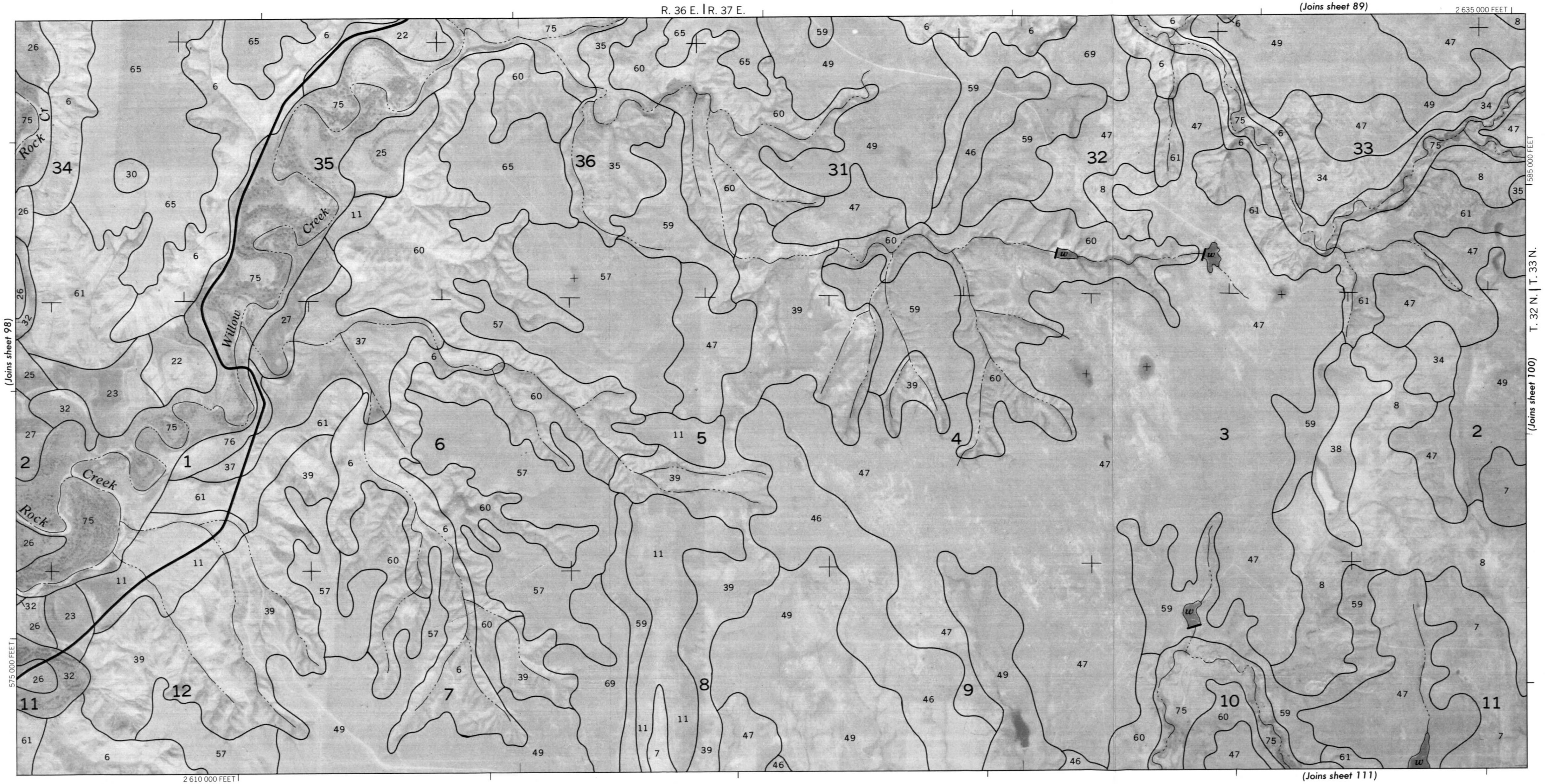
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

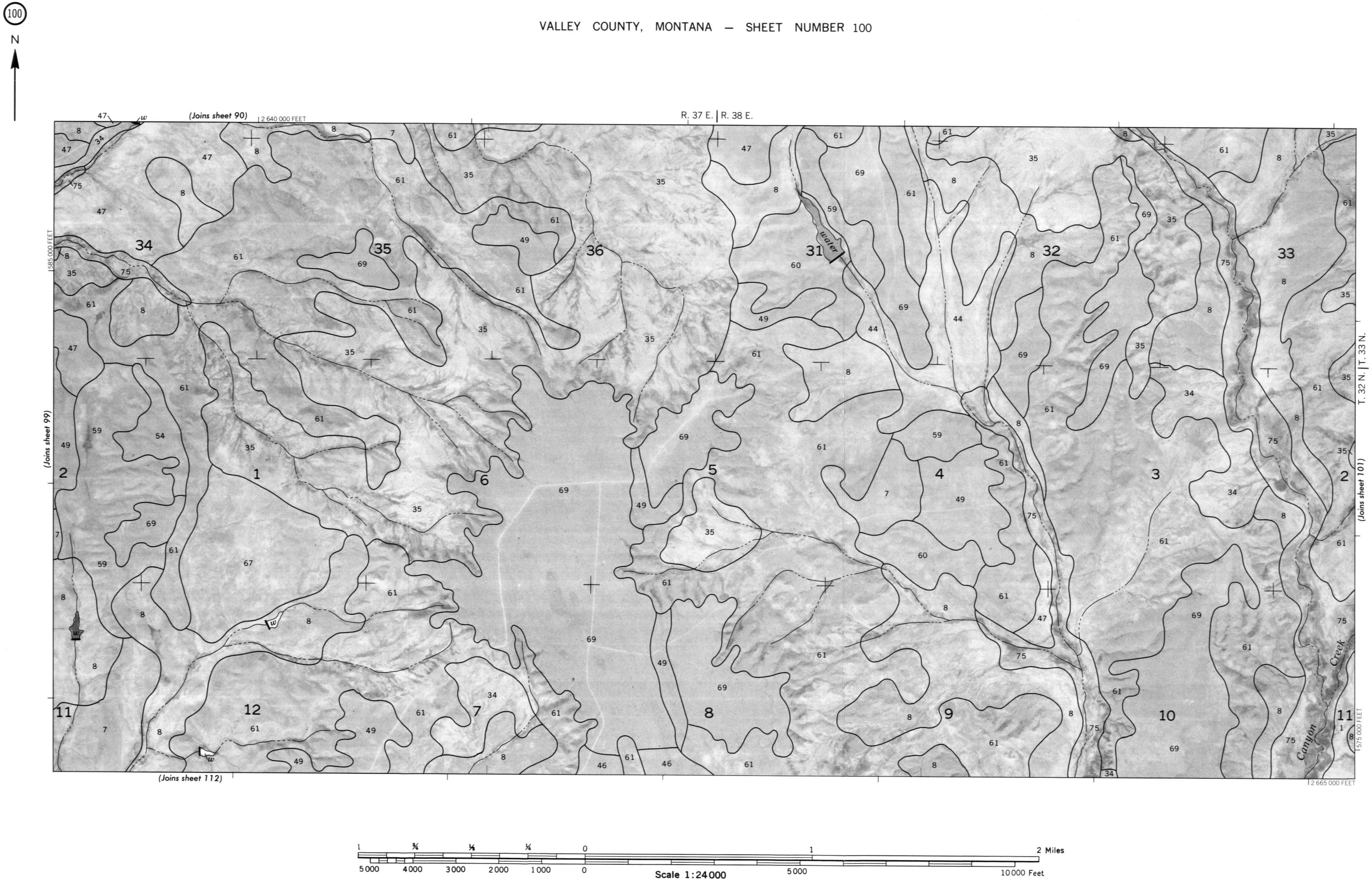
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 99

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

VALLEY COUNTY, MONTANA — SHEET NUMBER 100

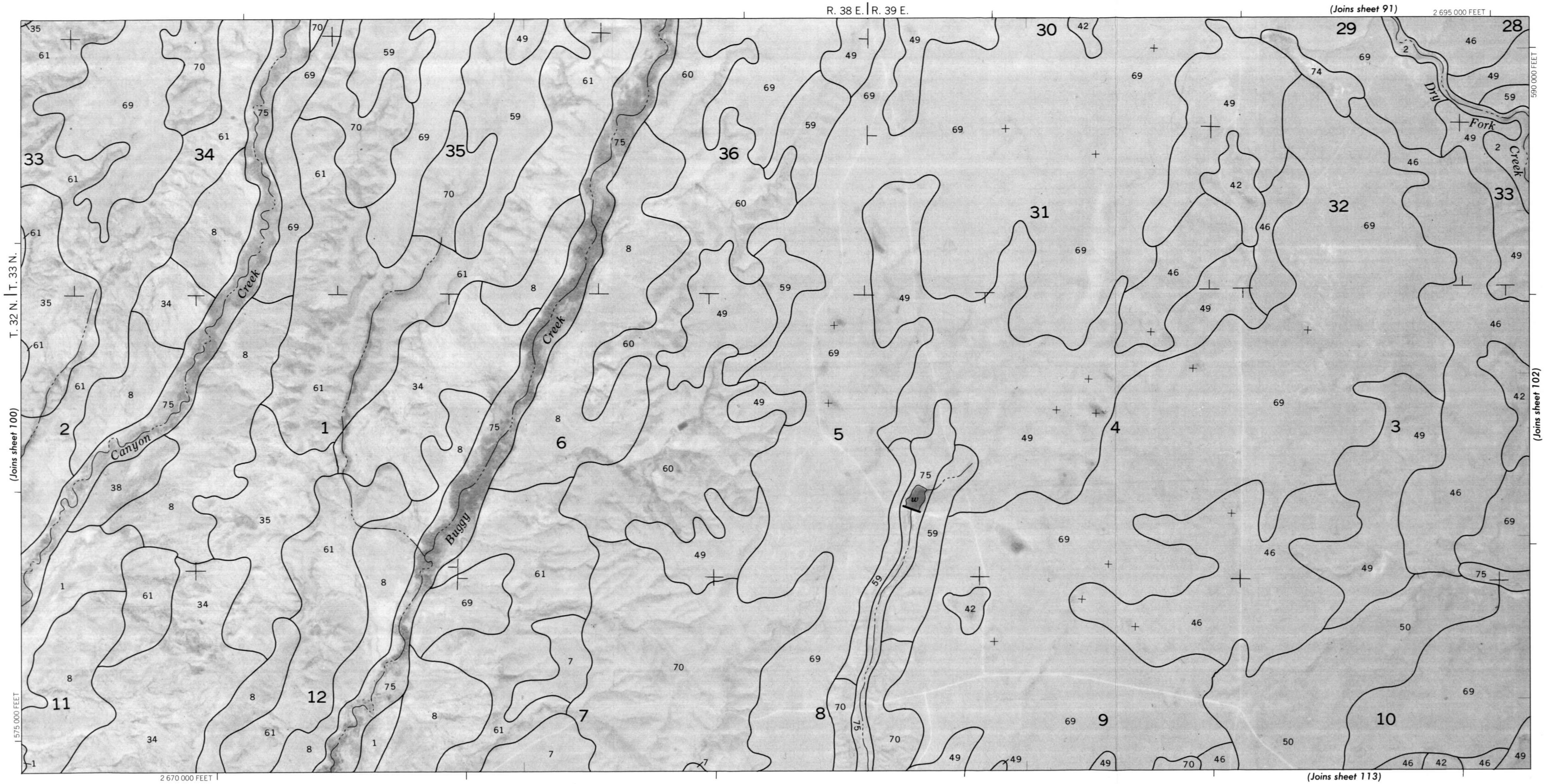


5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

101

N



Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

VALLEY COUNTY, MONTANA NO. 101

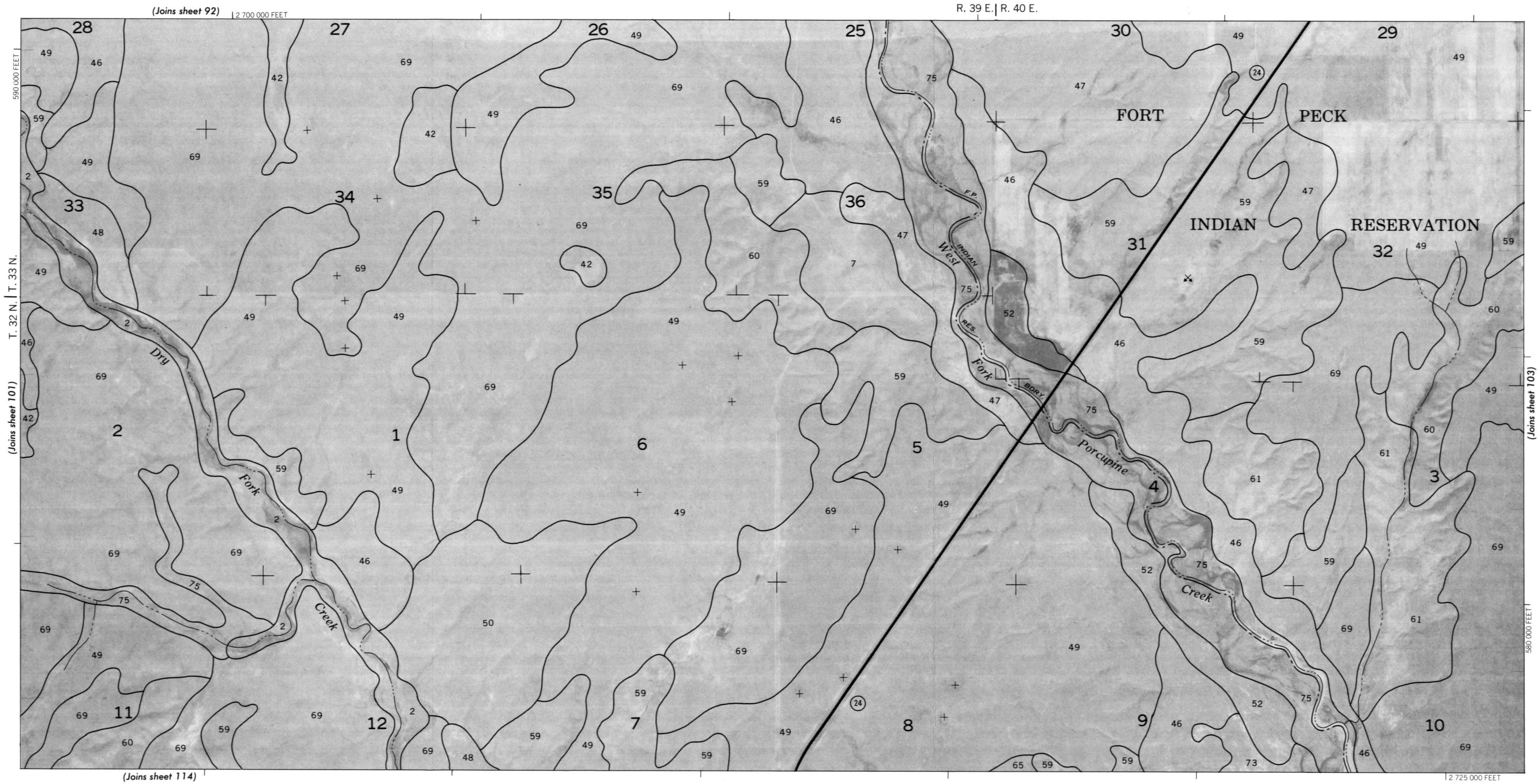
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

102

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 102



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

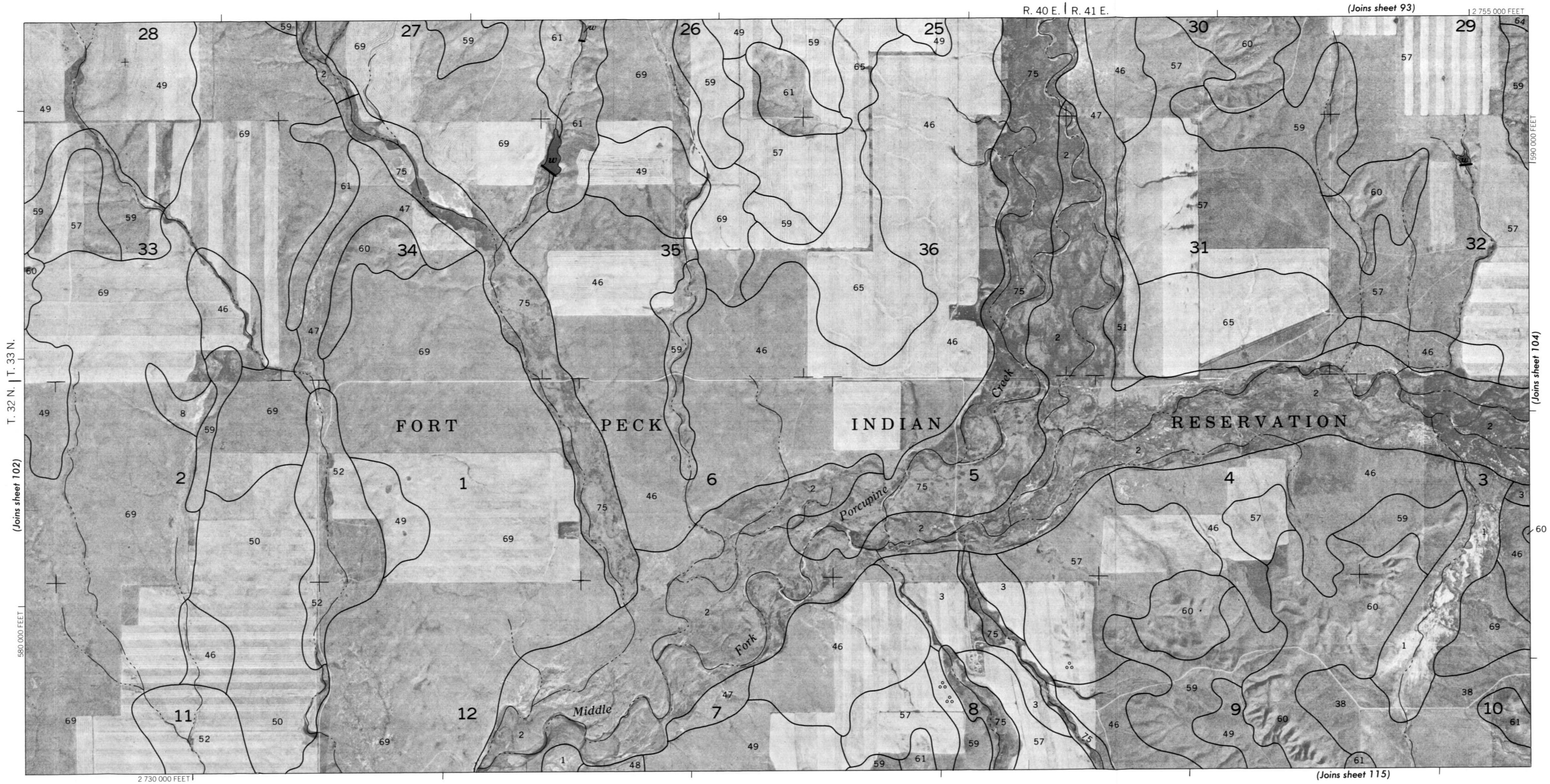
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 102

N

VALLEY COUNTY, MONTANA NO. 103

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

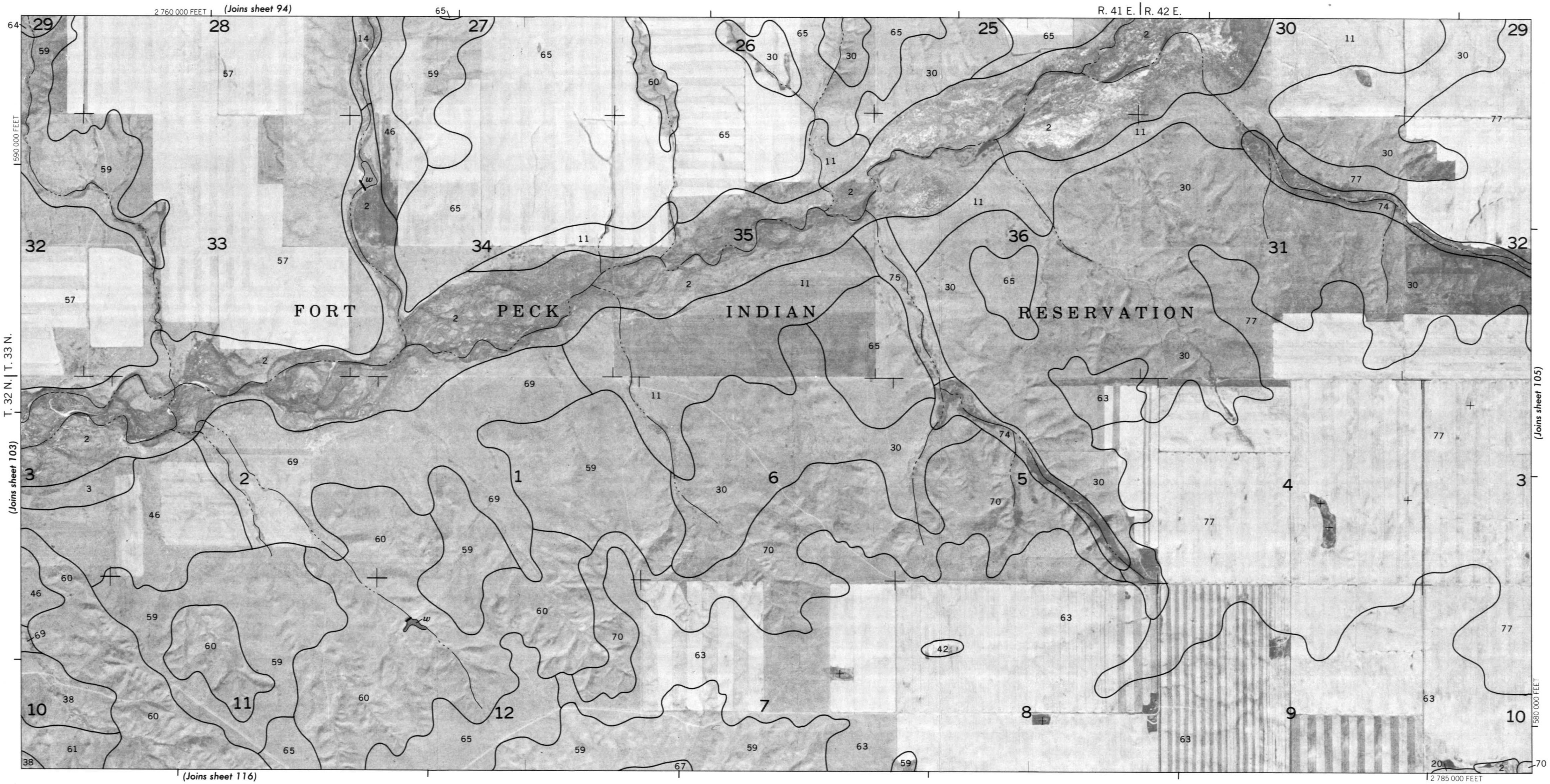
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

104

VALLEY COUNTY, MONTANA — SHEET NUMBER 104

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map was compiled on 1974, 1975 and 1976 U.S. Department of the Interior Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

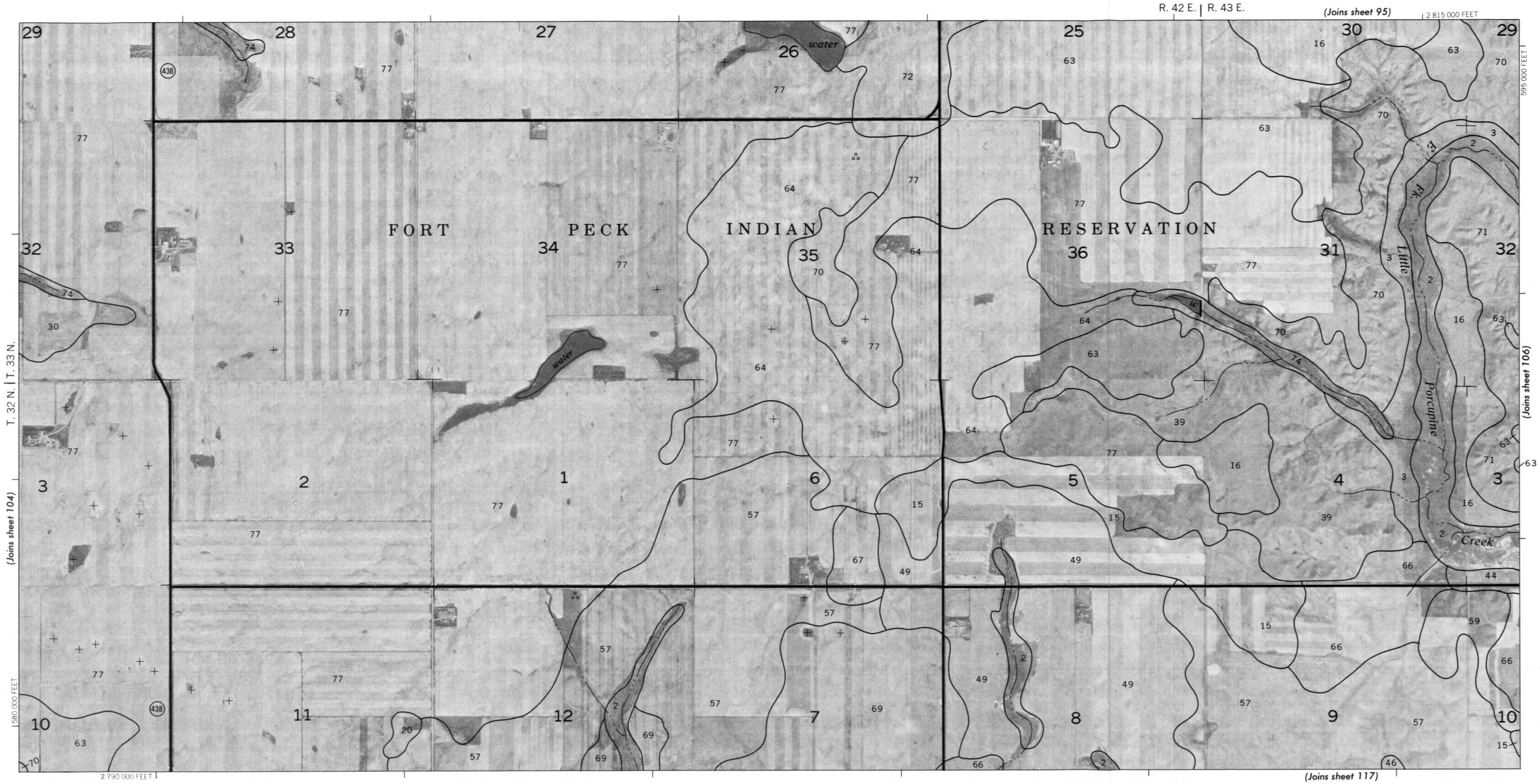
VALLEY COUNTY, MONTANA NO. 104

105

N

VALLEY COUNTY, MONTANA NO. 105

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

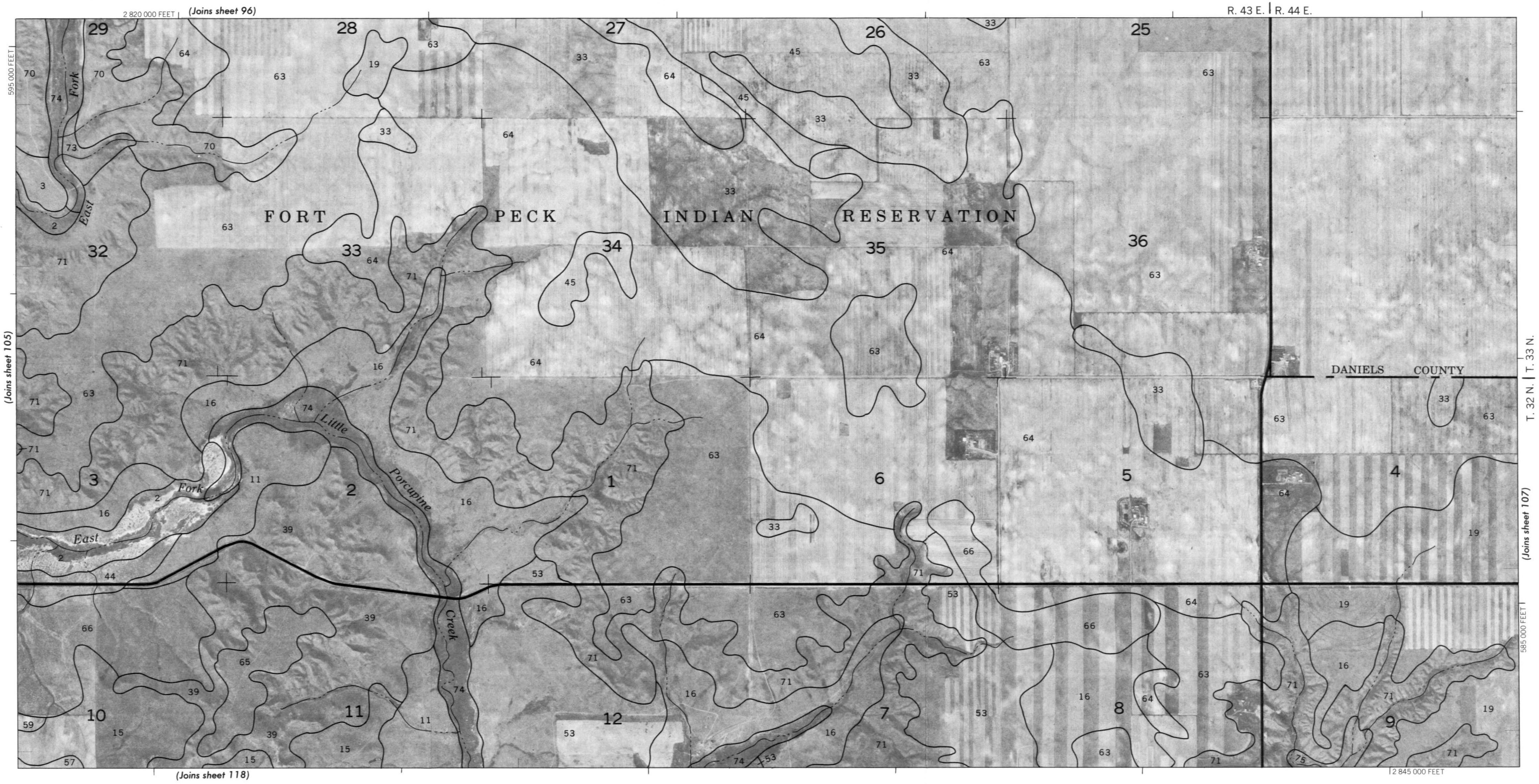
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

106

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 106



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10 000 Feet

Scale 1:24 000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

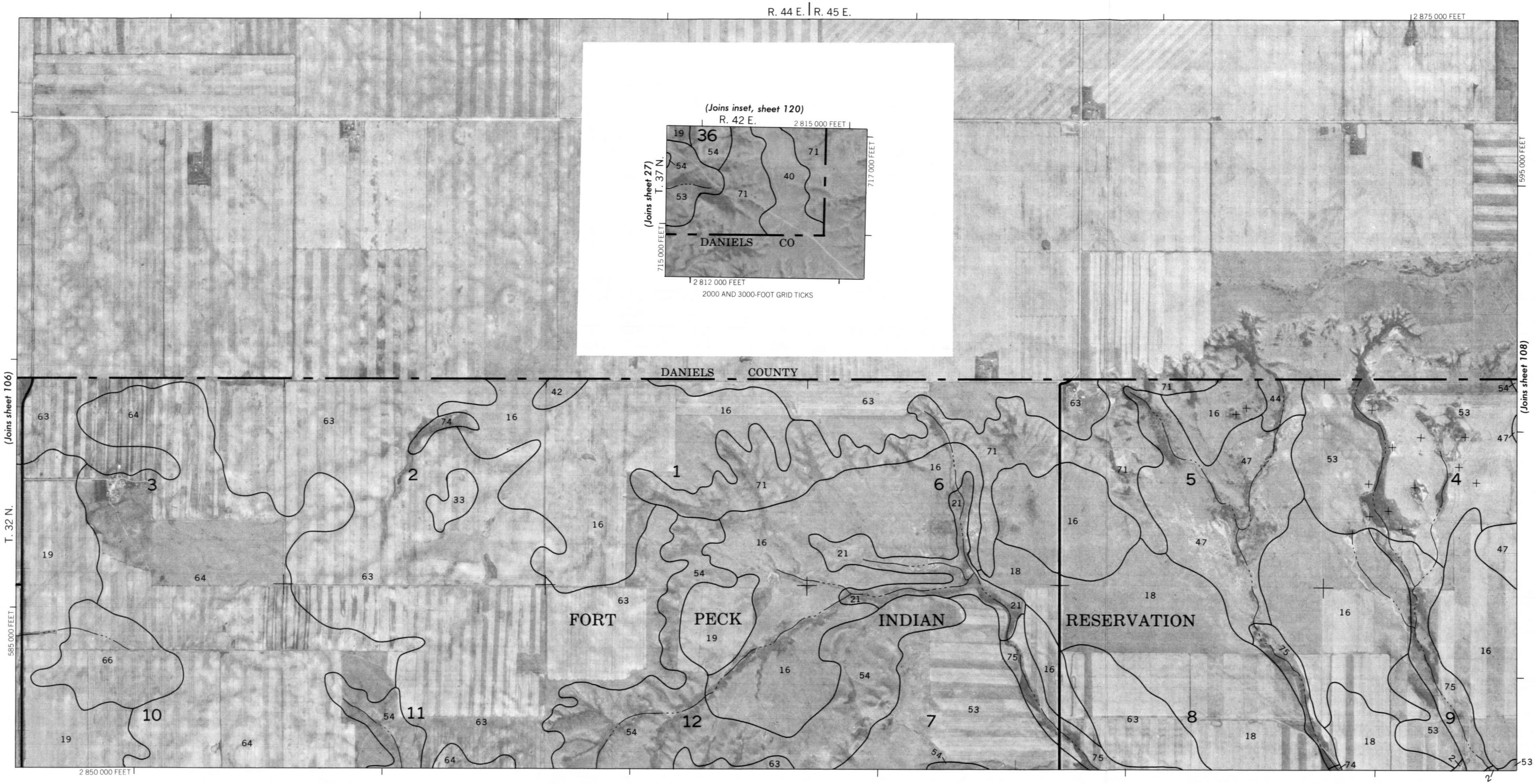
VALLEY COUNTY, MONTANA NO. 106

107

N

VALLEY COUNTY, MONTANA NO. 107

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5 000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



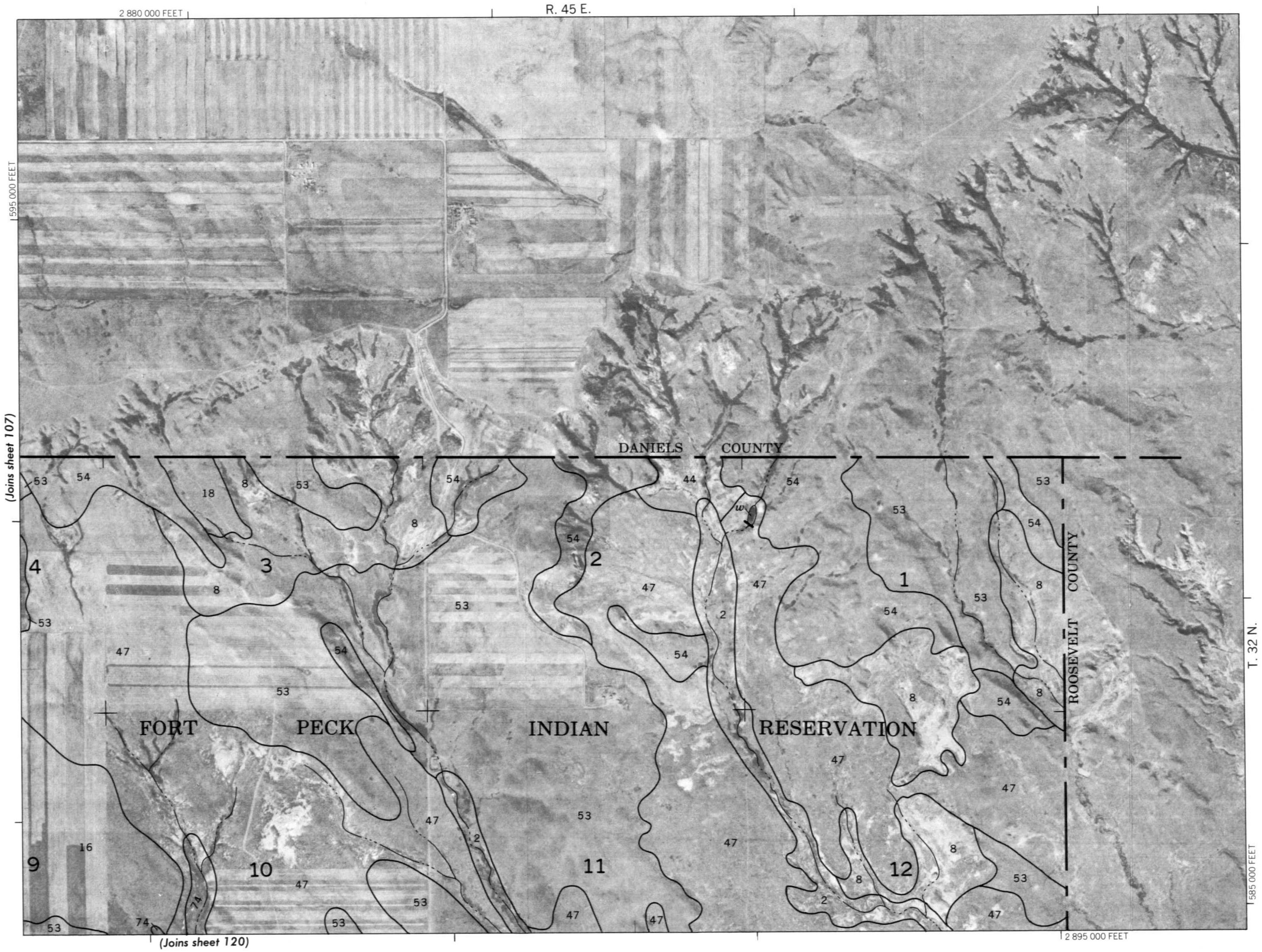
1 ¾ ½ ¼ 0 1 2 Miles

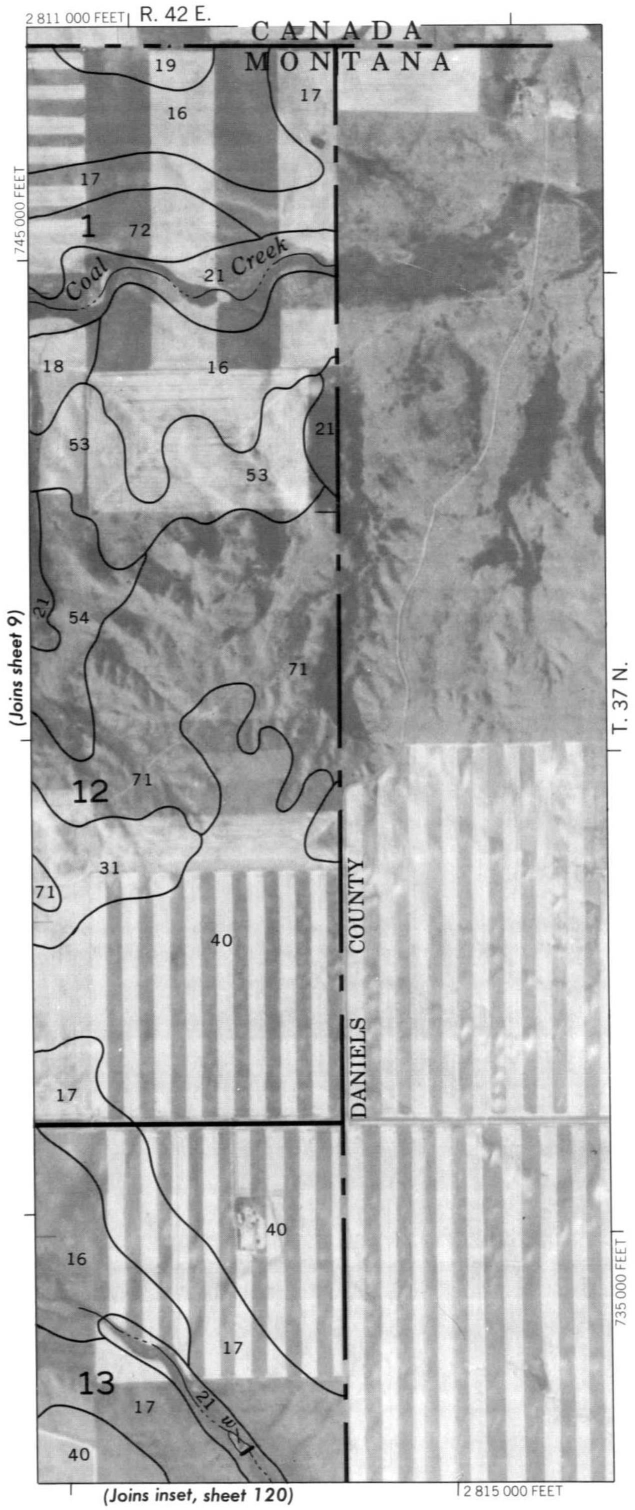
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 108

N





4000 AND 5000-FOOT GRID TICKS

1 ¾ ½ ¼ 0 1 2 Miles

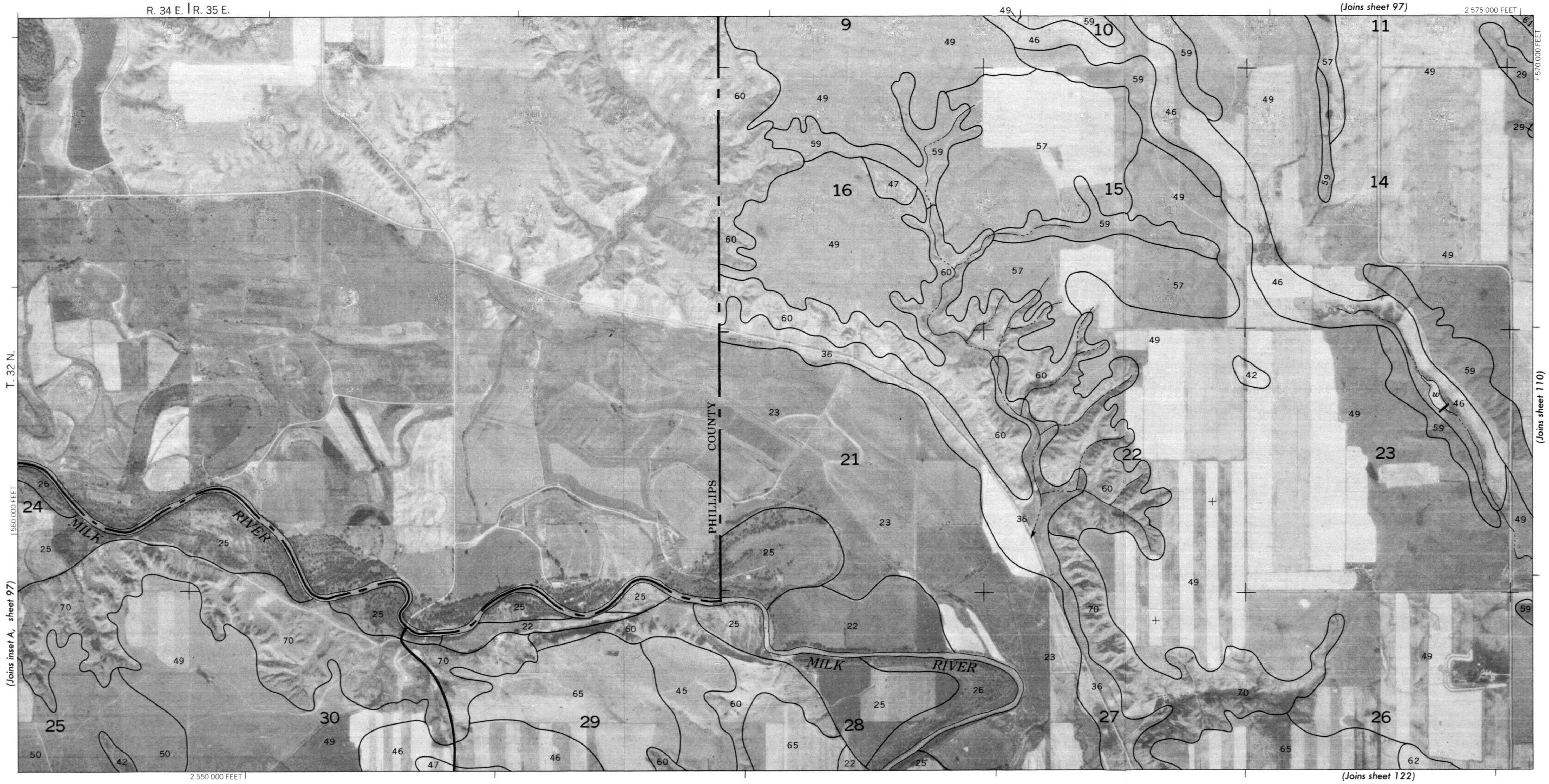
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

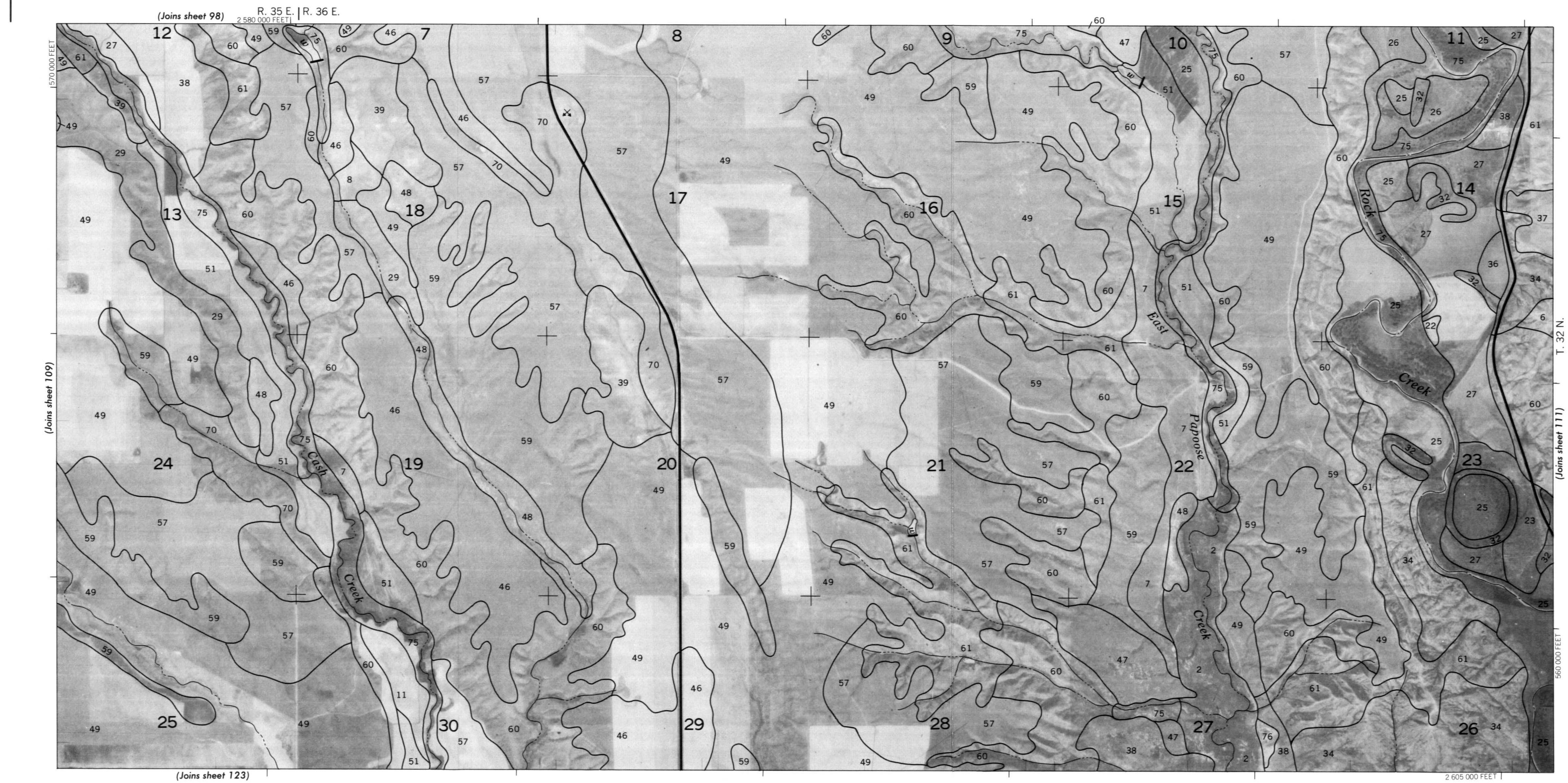
VALLEY COUNTY, MONTANA NO. 109

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

110

VALLEY COUNTY, MONTANA — SHEET NUMBER 110



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

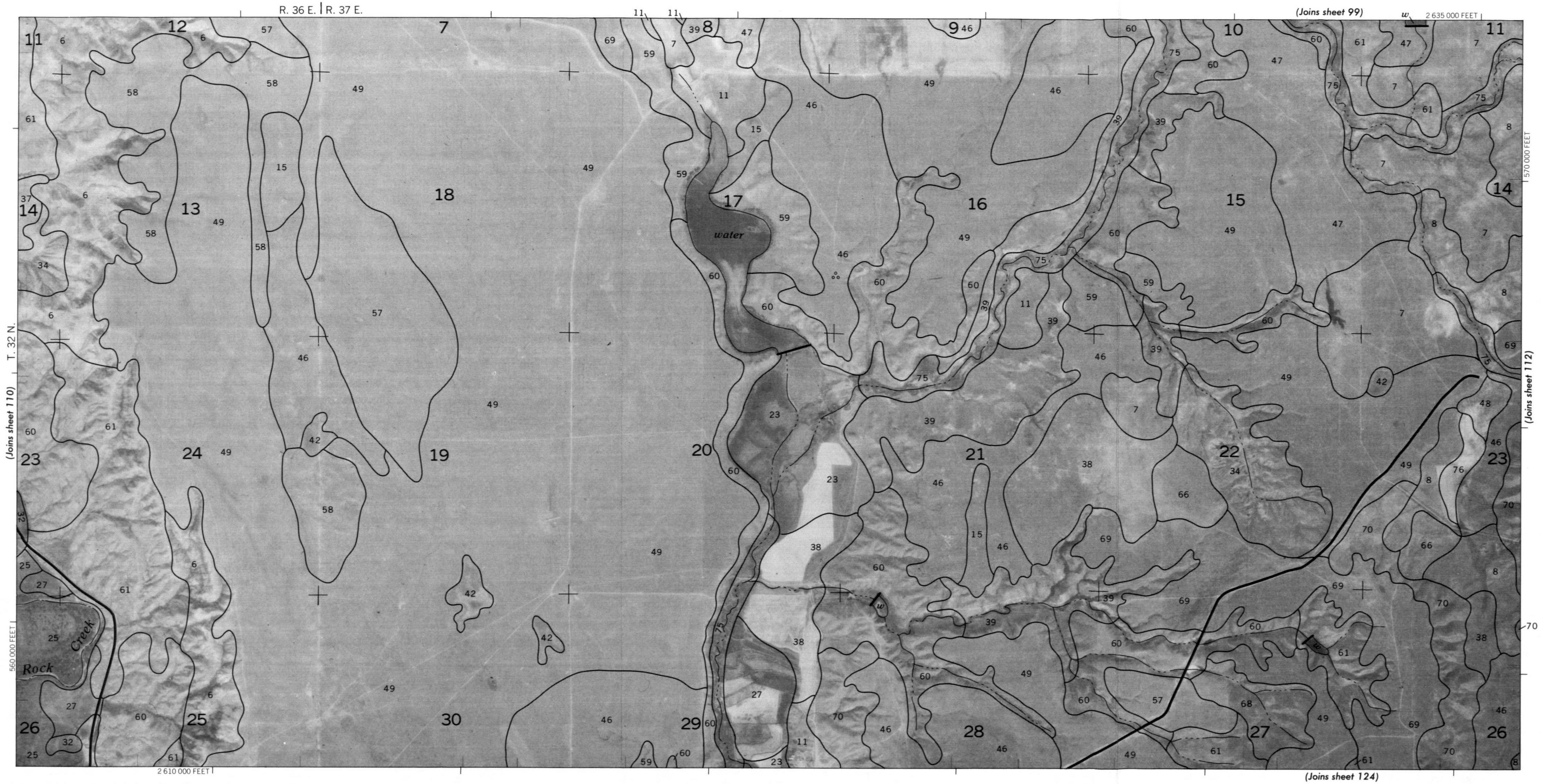
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 110

111

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

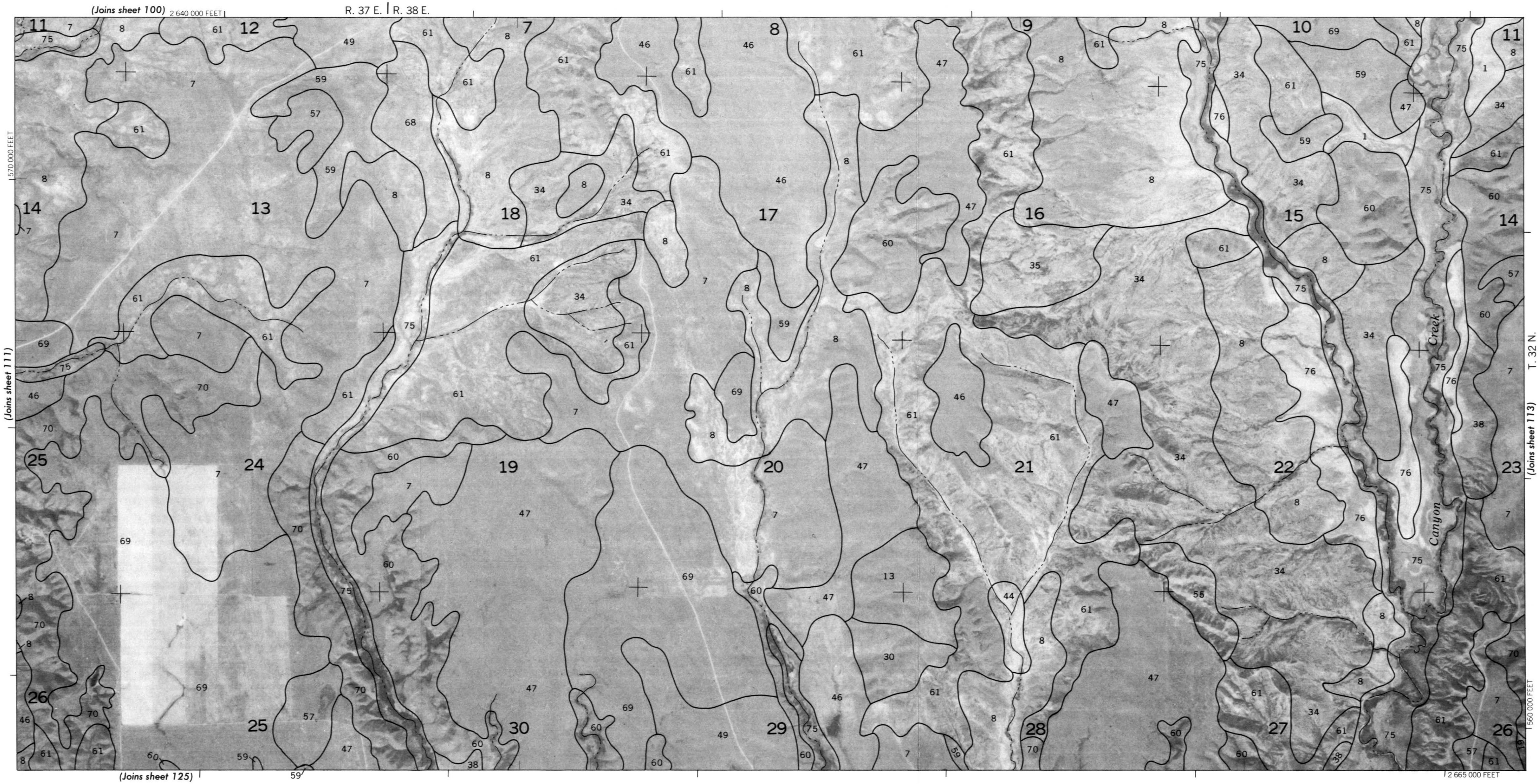
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 111

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 112



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

113

N

VALLEY COUNTY, MONTANA NO. 113

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 114

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

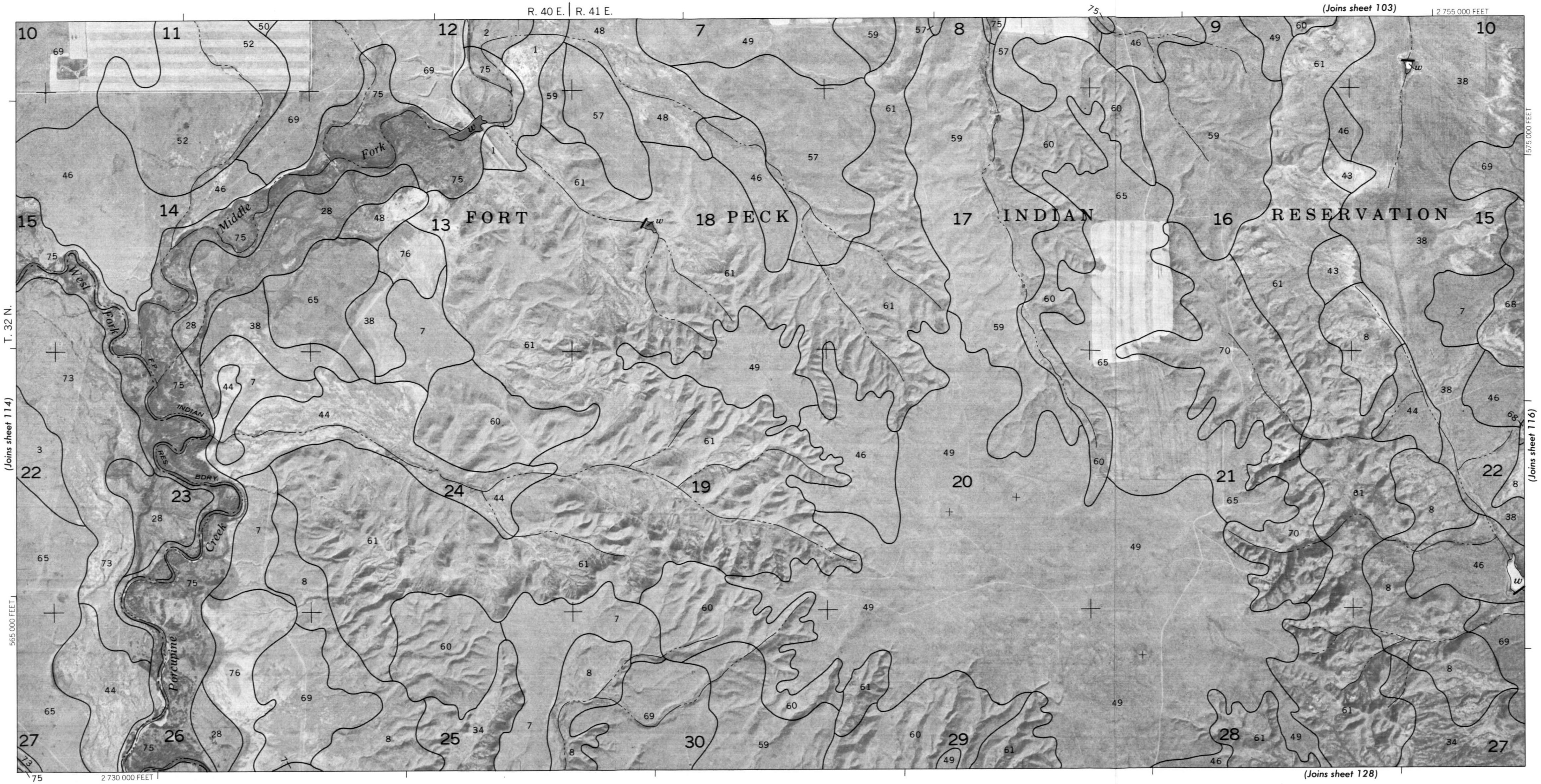
VALLEY COUNTY, MONTANA NO. 115

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. 5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

N

R. 40 E. | R. 41 E.

(Joins sheet 103)

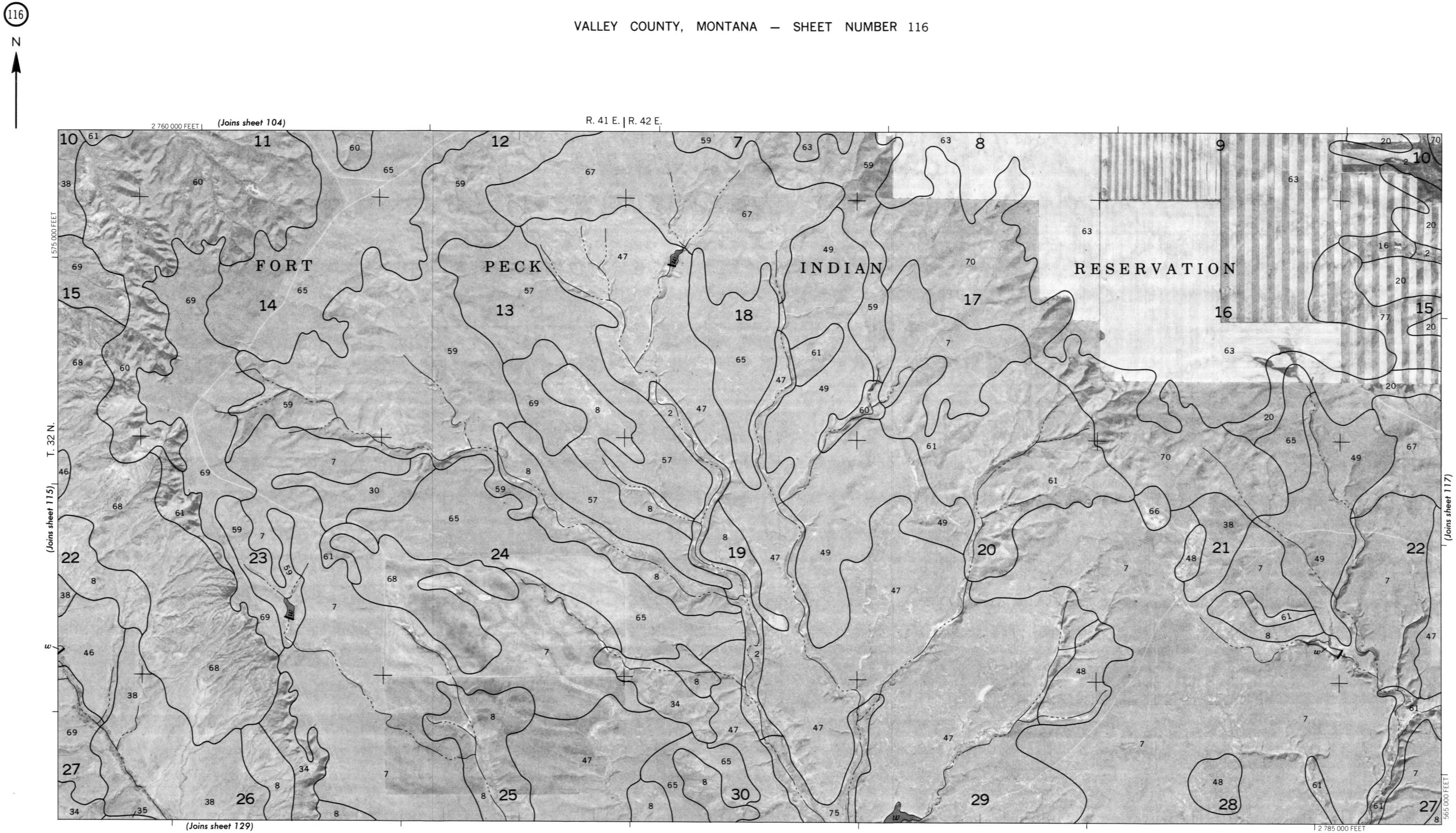


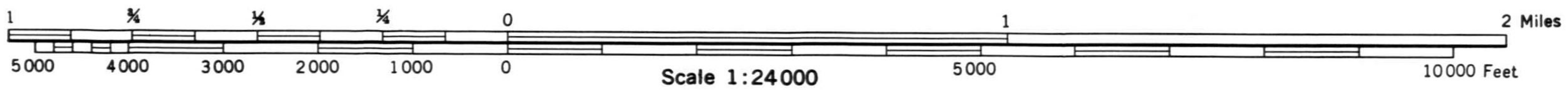
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 116





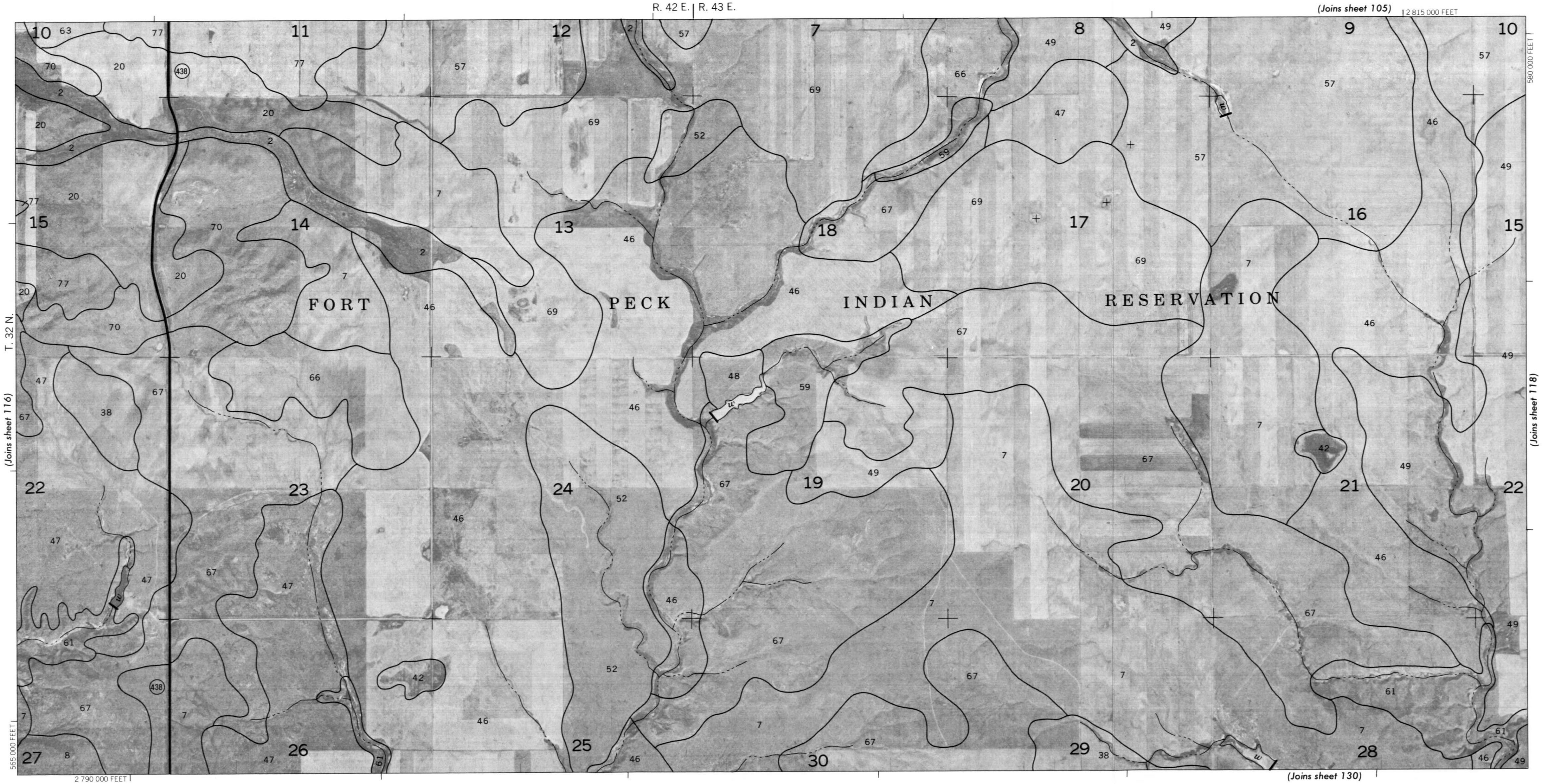
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 116

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

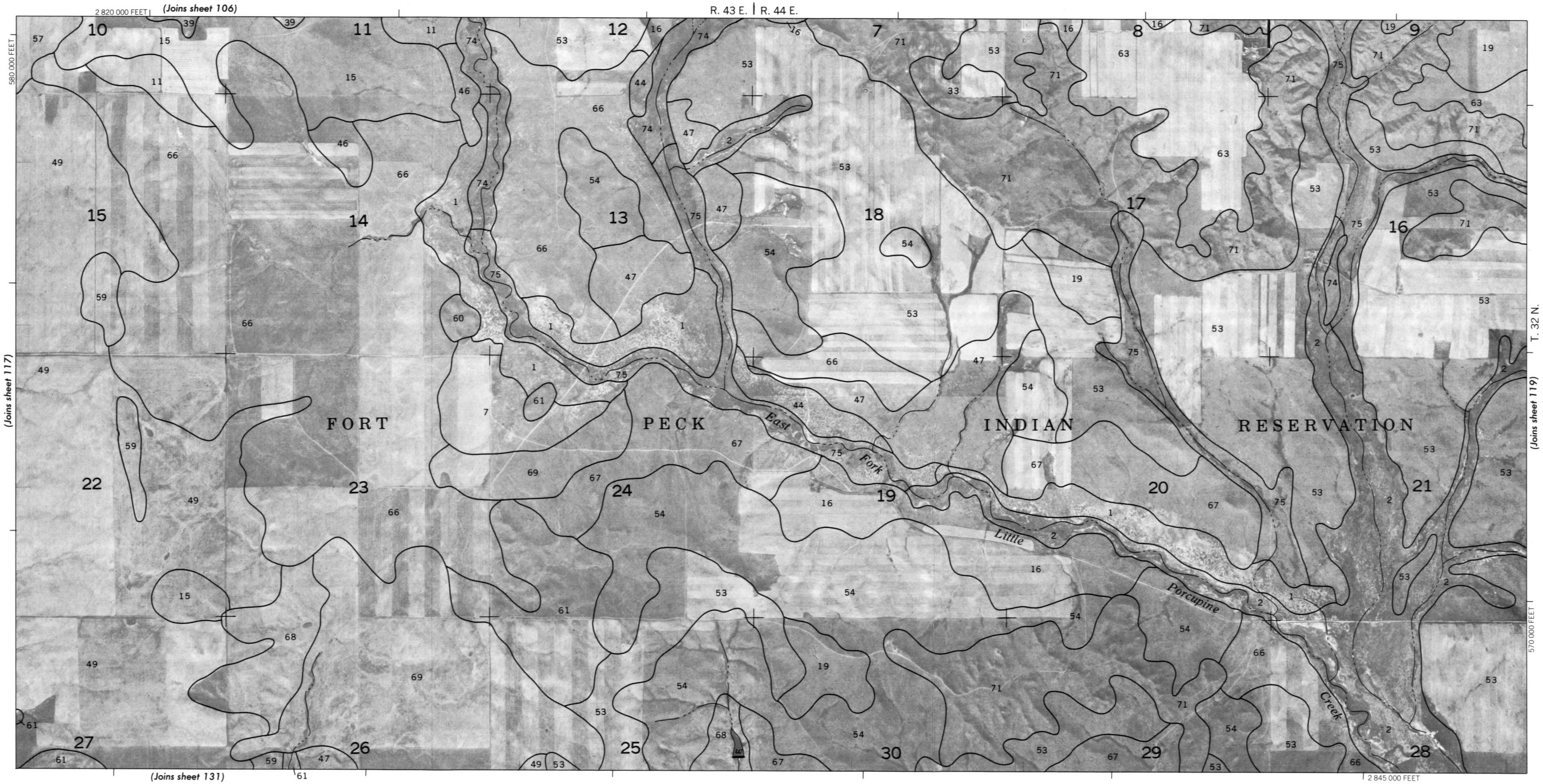
Scale 1:24000

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

118

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 118



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

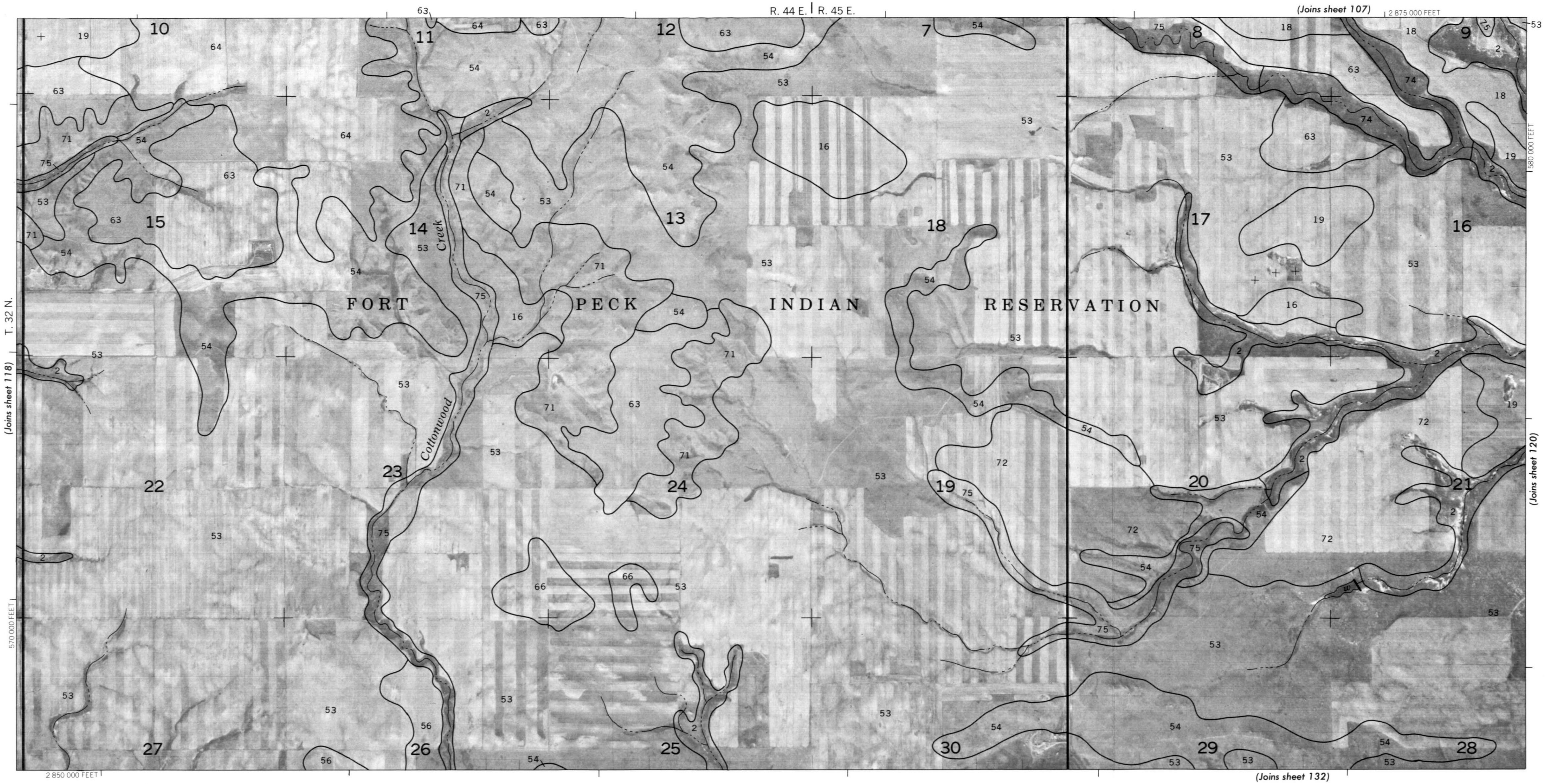
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

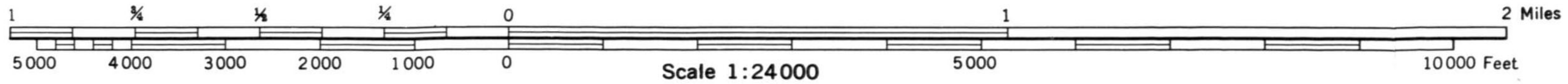
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 118

119

N





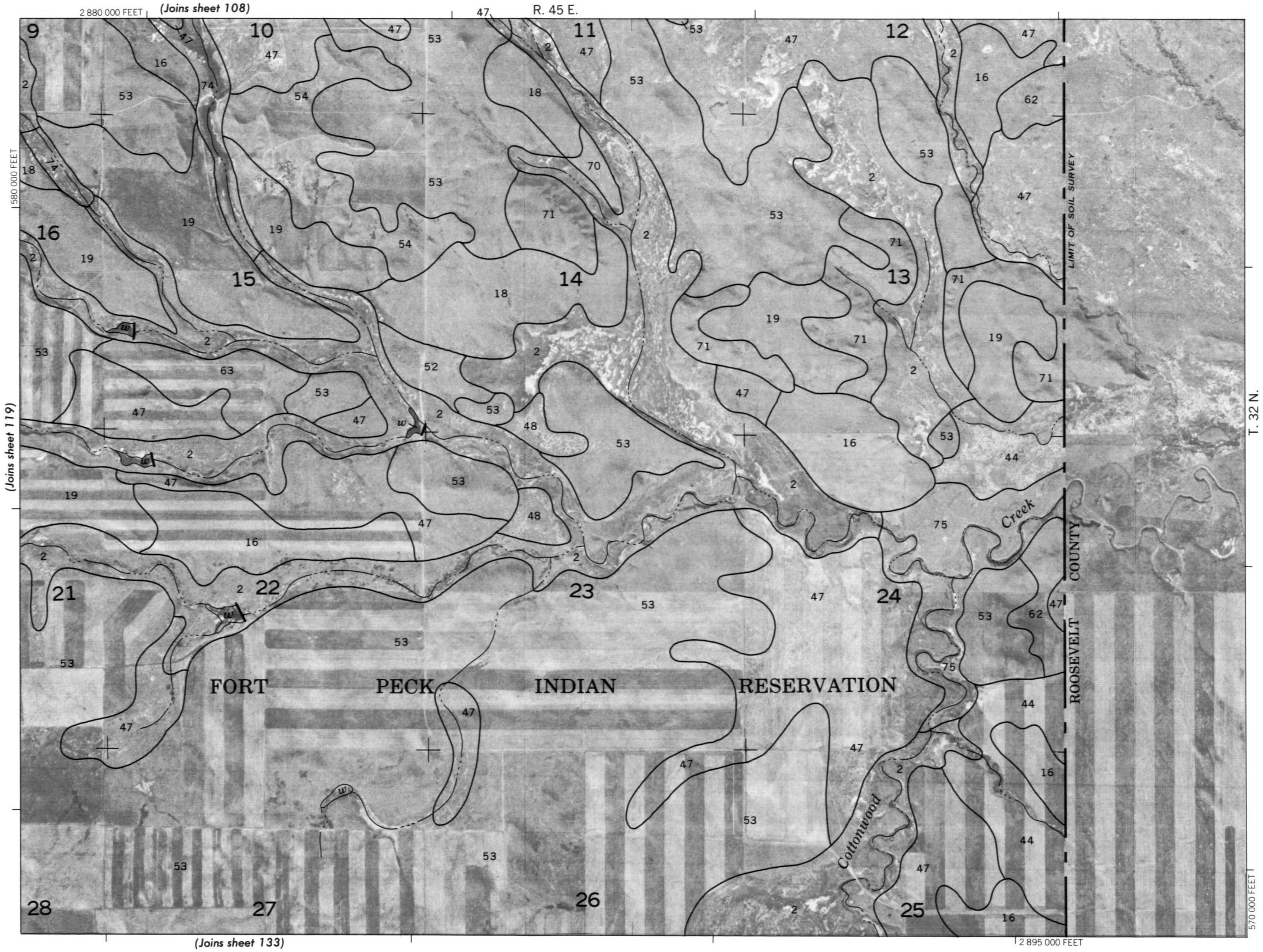
Scale 1:24000

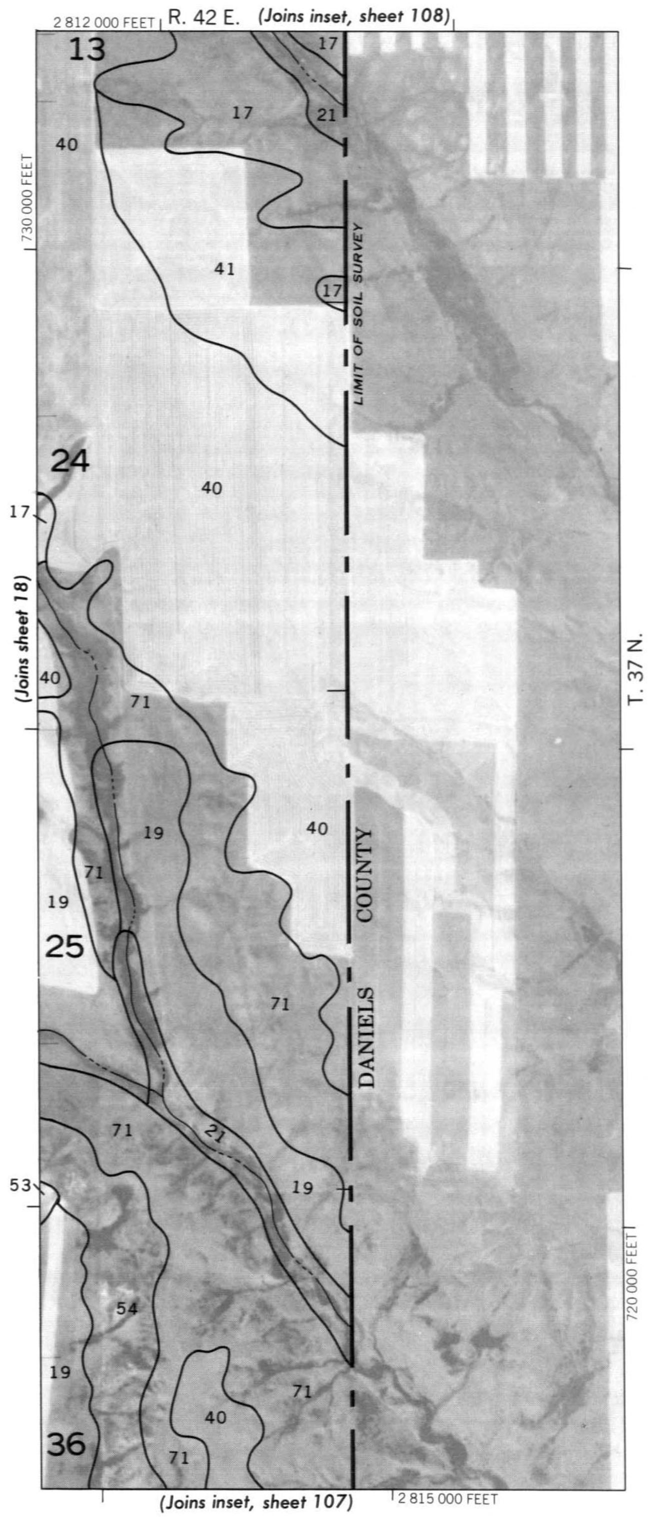
VALLEY COUNTY, MONTANA NO. 119

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 120





3000 AND 5000-FOOT GRID TICKS

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10 000 Feet

Scale 1:24 000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA NO. 121

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Grological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

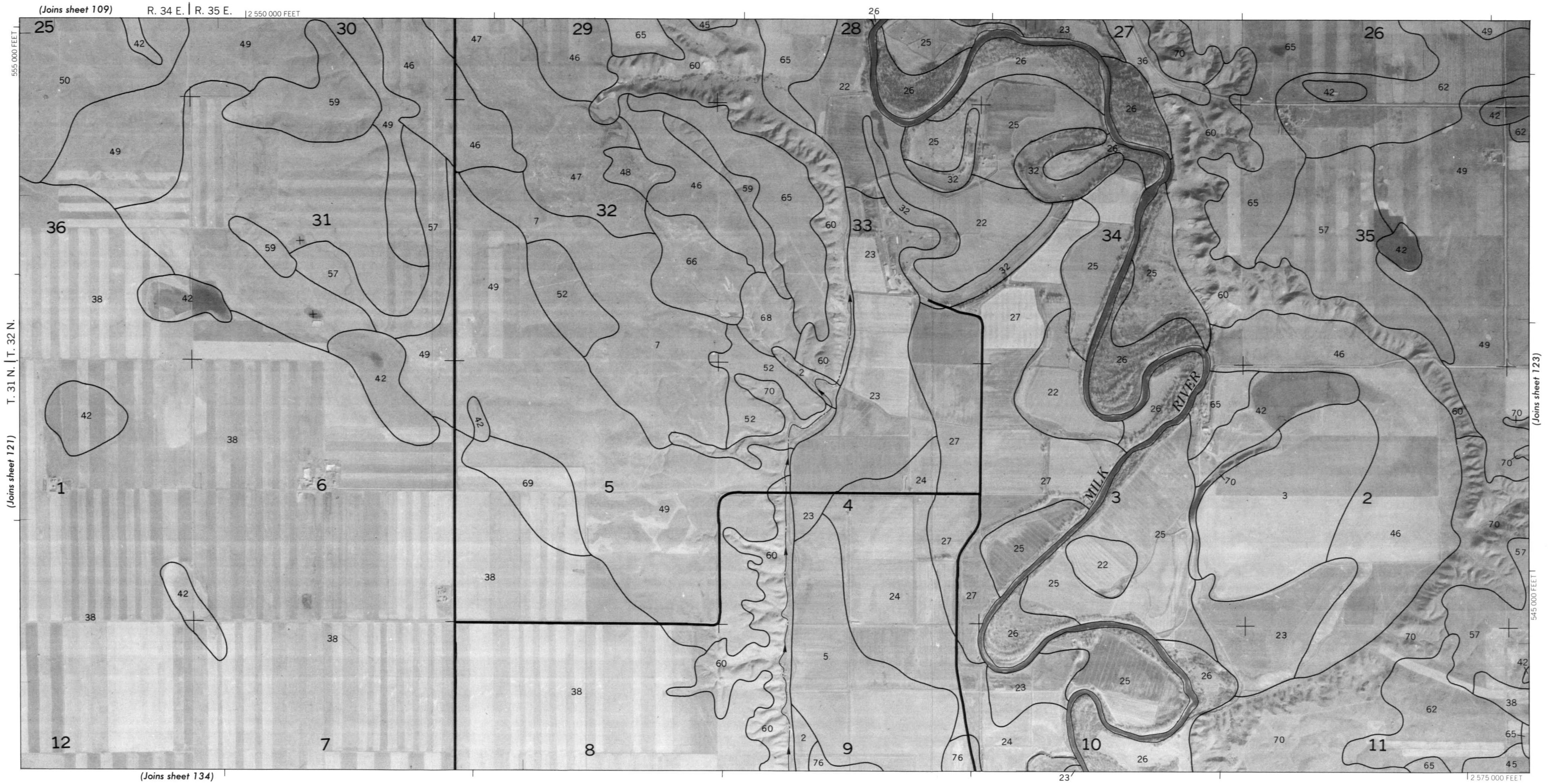
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

122

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 122



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

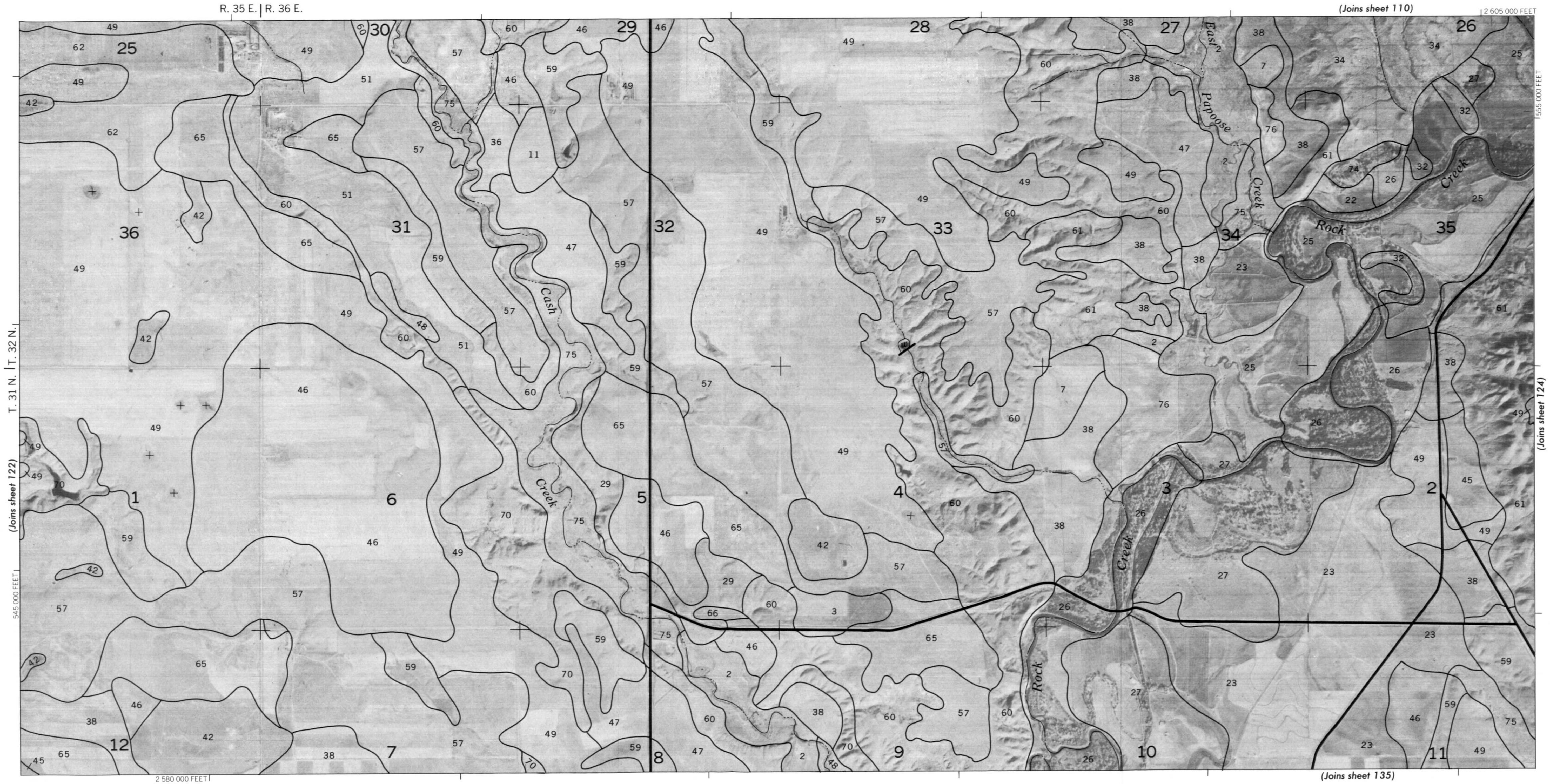
VALLEY COUNTY, MONTANA NO. 122

123

N

VALLEY COUNTY, MONTANA NO. 123

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

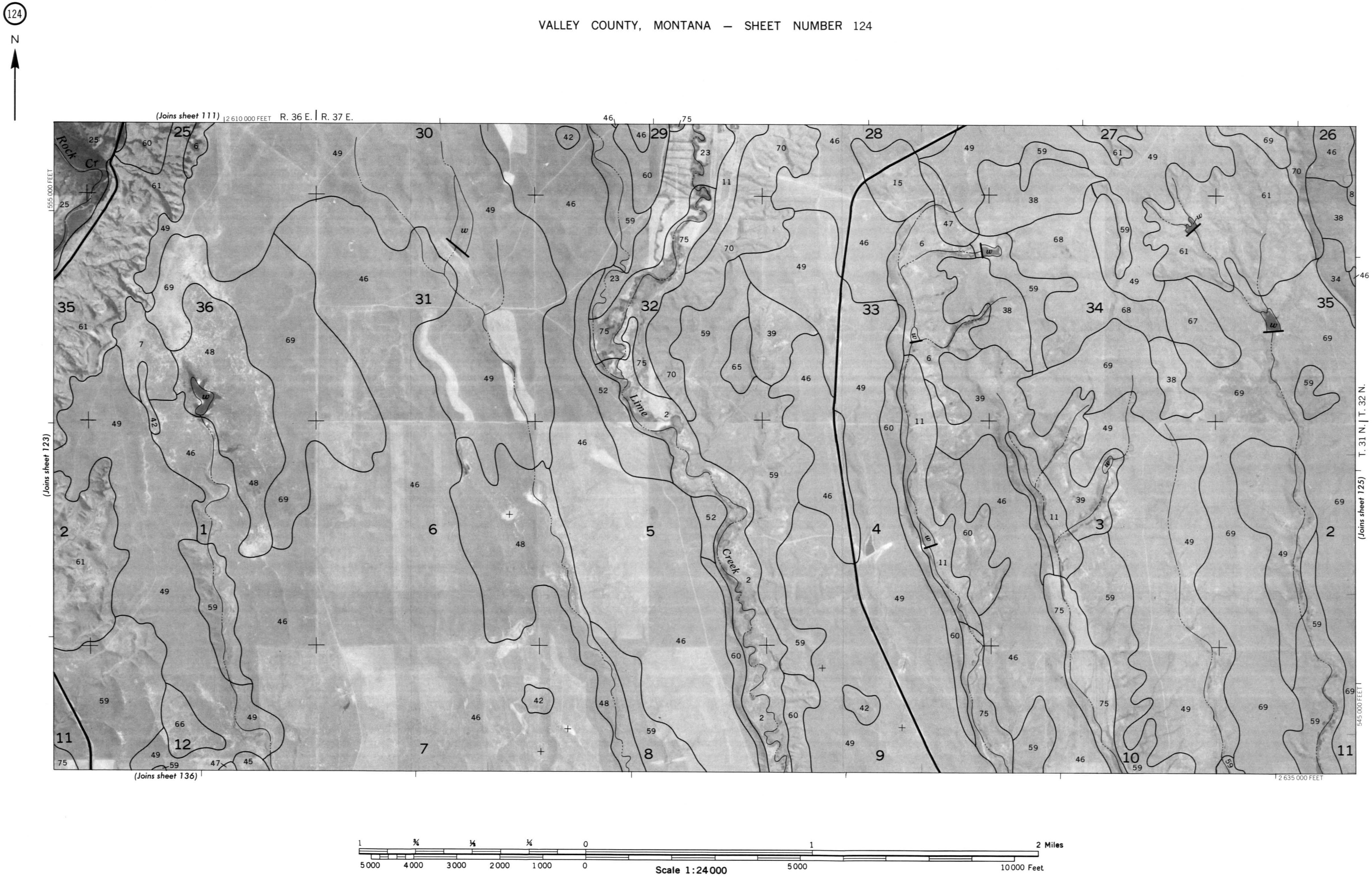


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 124



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

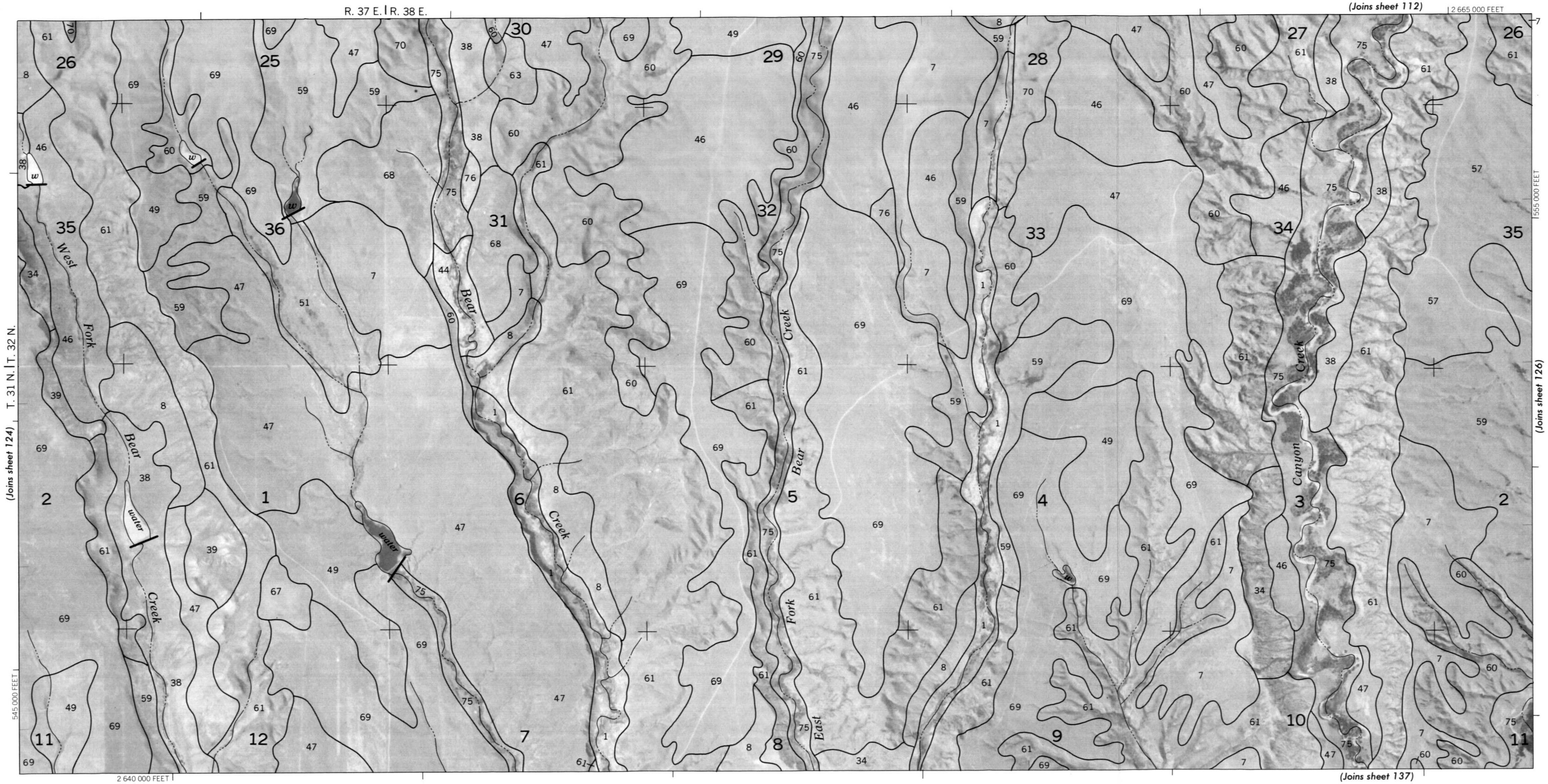
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

125

N

VALLEY COUNTY, MONTANA NO. 125

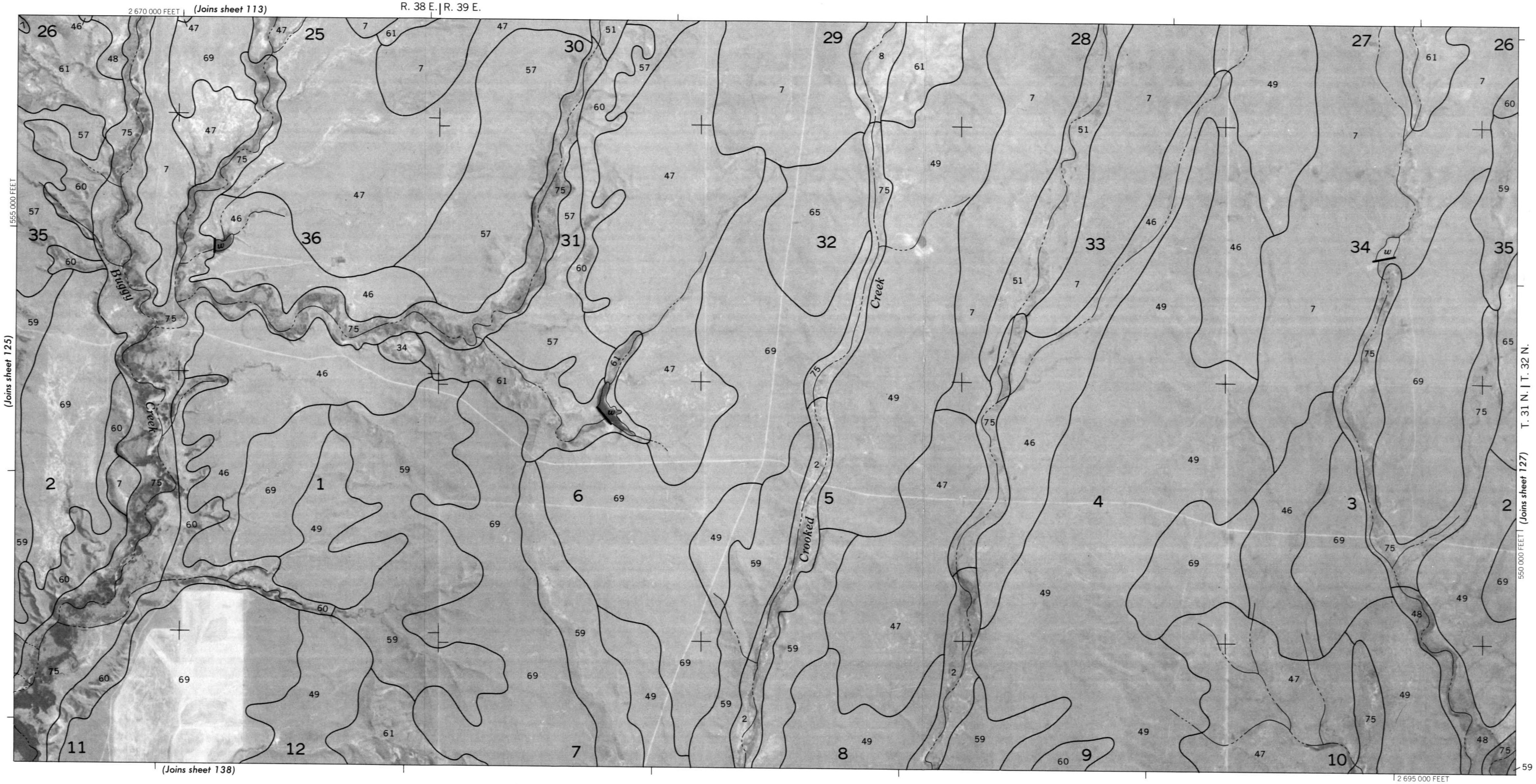
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 126

N



1 ¾ ½ ¼ 0 1 2 Miles

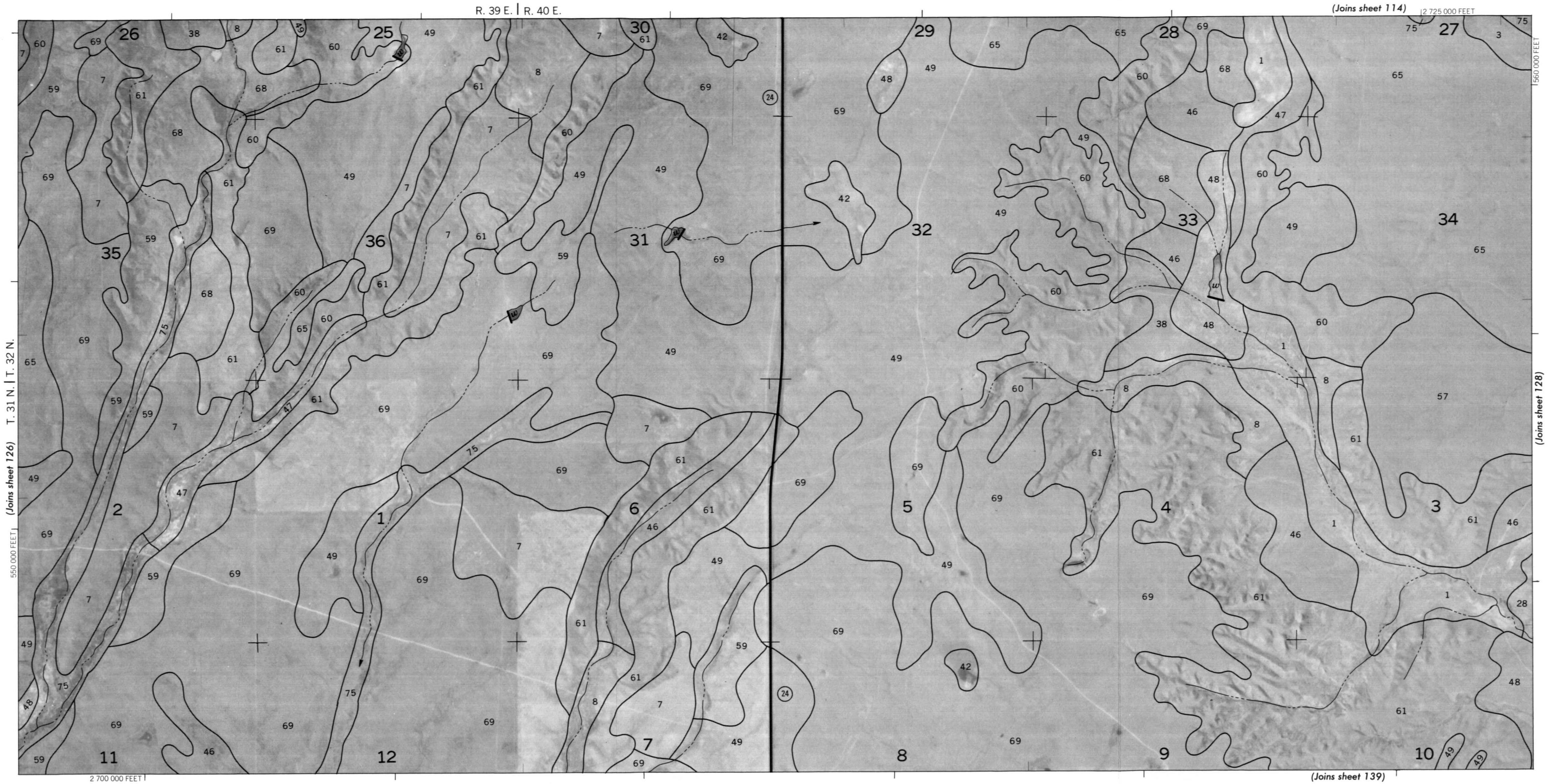
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



VALLEY COUNTY, MONTANA NO. 127

This map was compiled on 1974, 1975 and 1976 U.S. Department of the Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

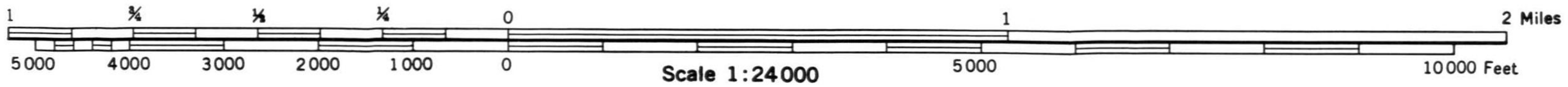
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 128



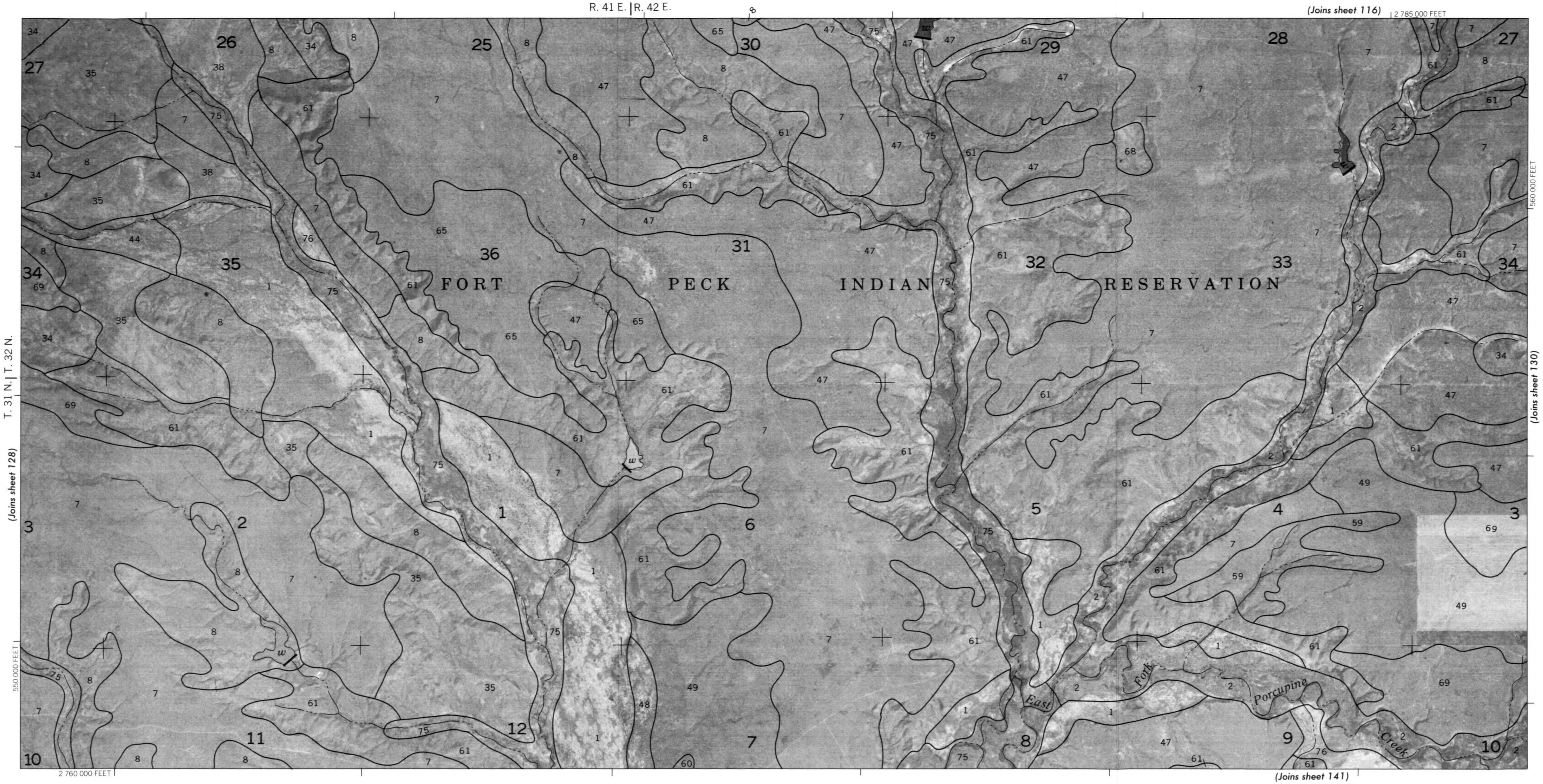
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 128

129

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

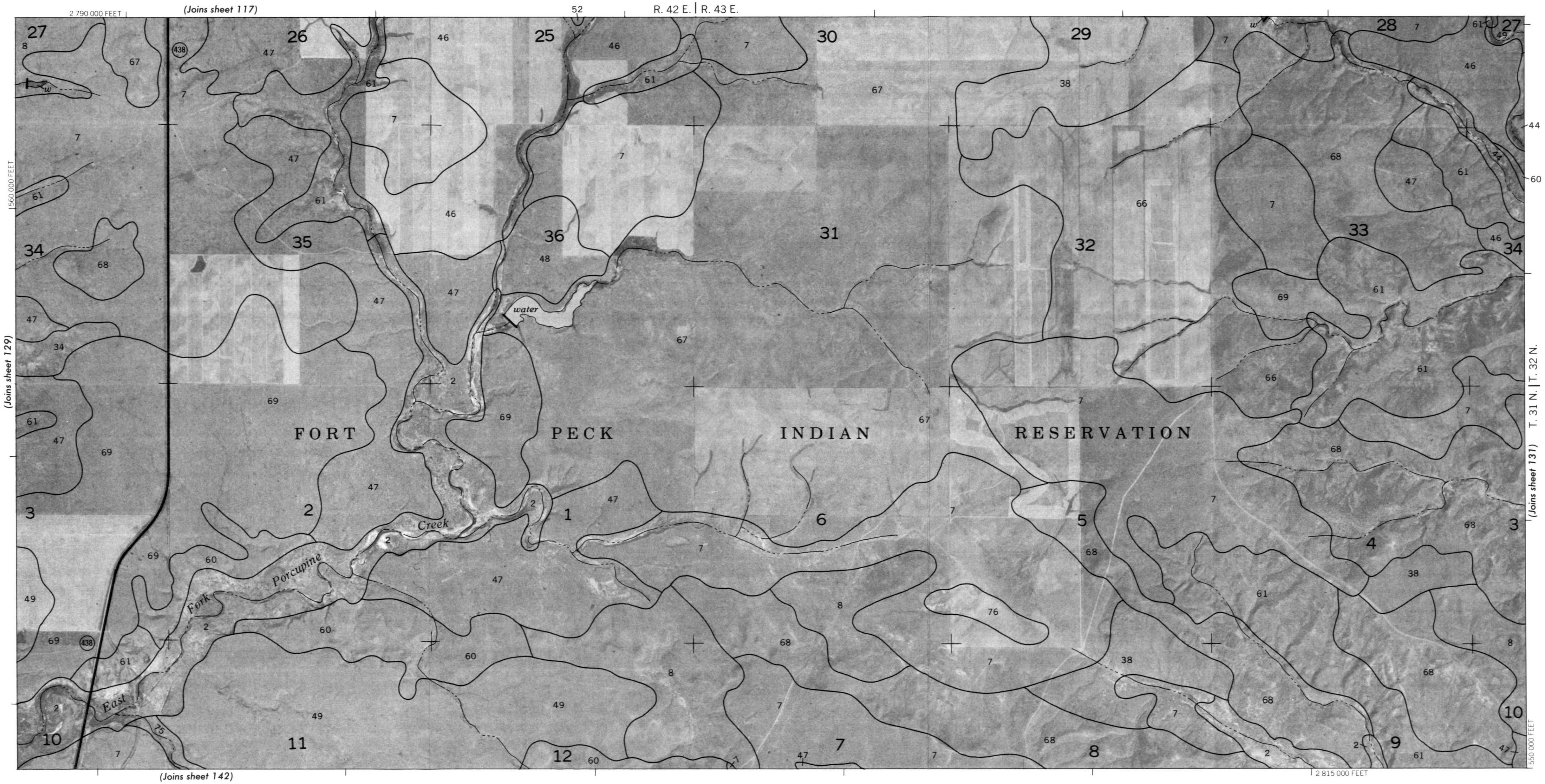
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 129

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 130



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

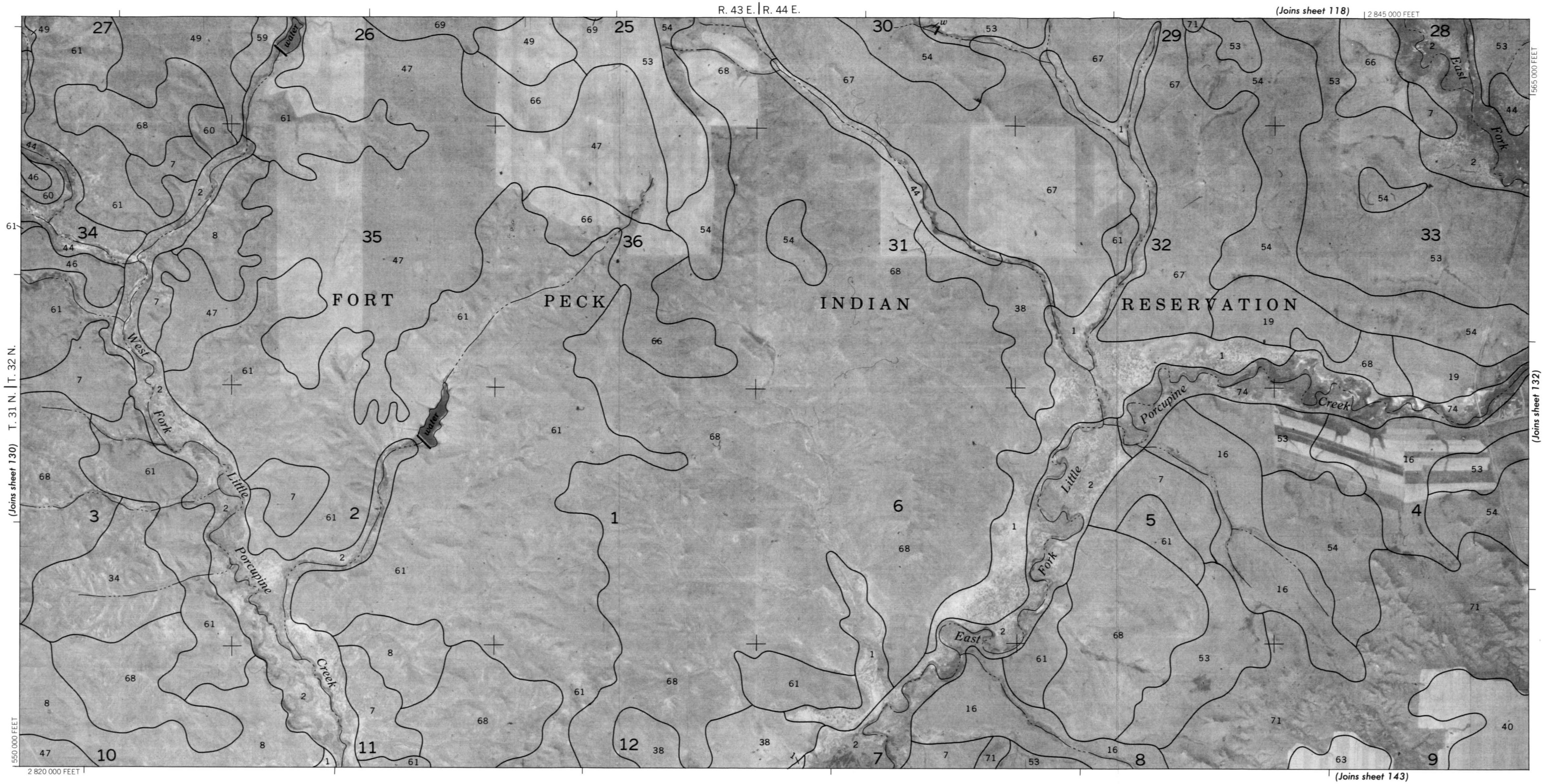
Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

131

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

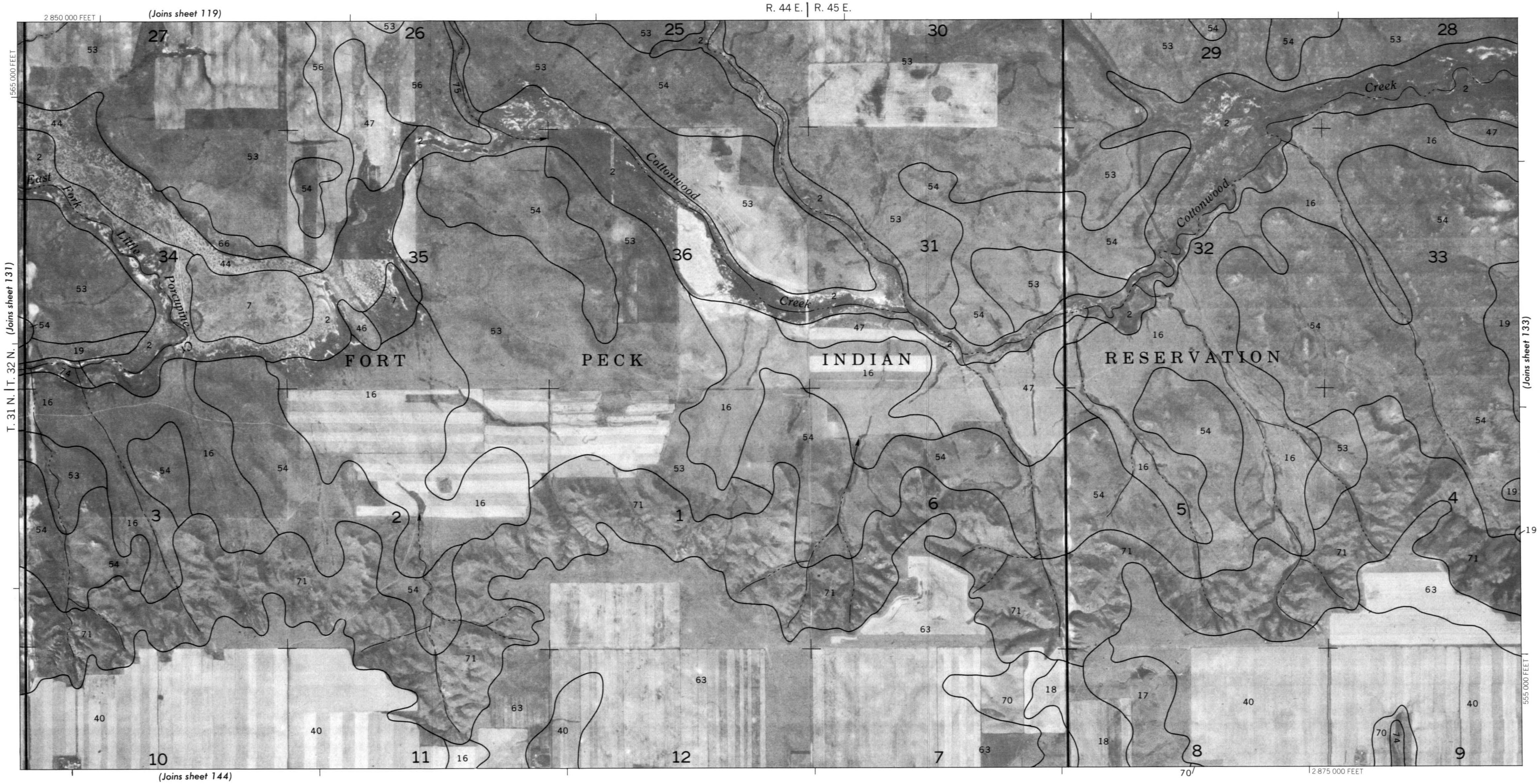
Scale 1:24000

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

132

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 132



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

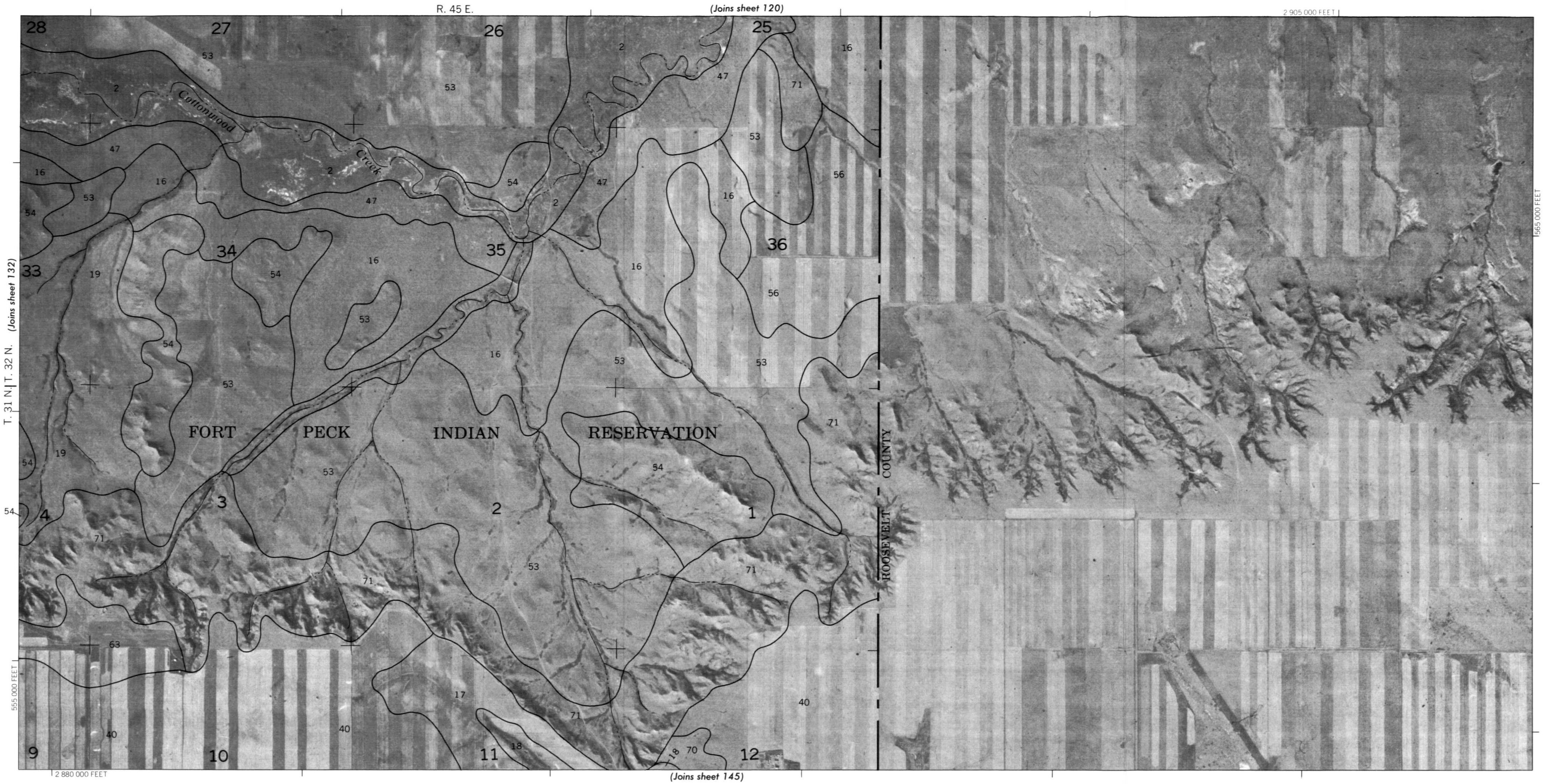
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

N

VALLEY COUNTY, MONTANA NO. 133

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

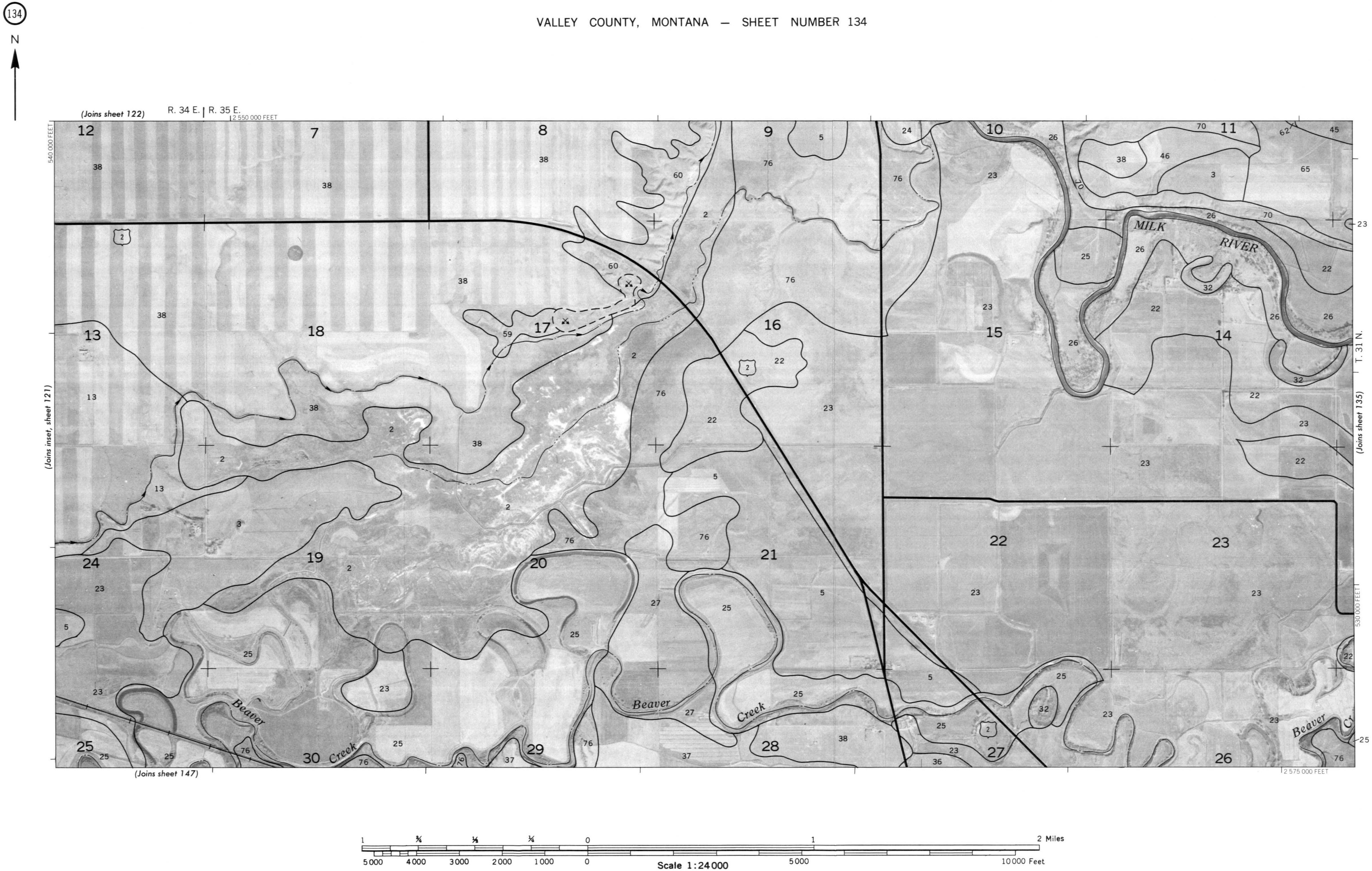


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 134

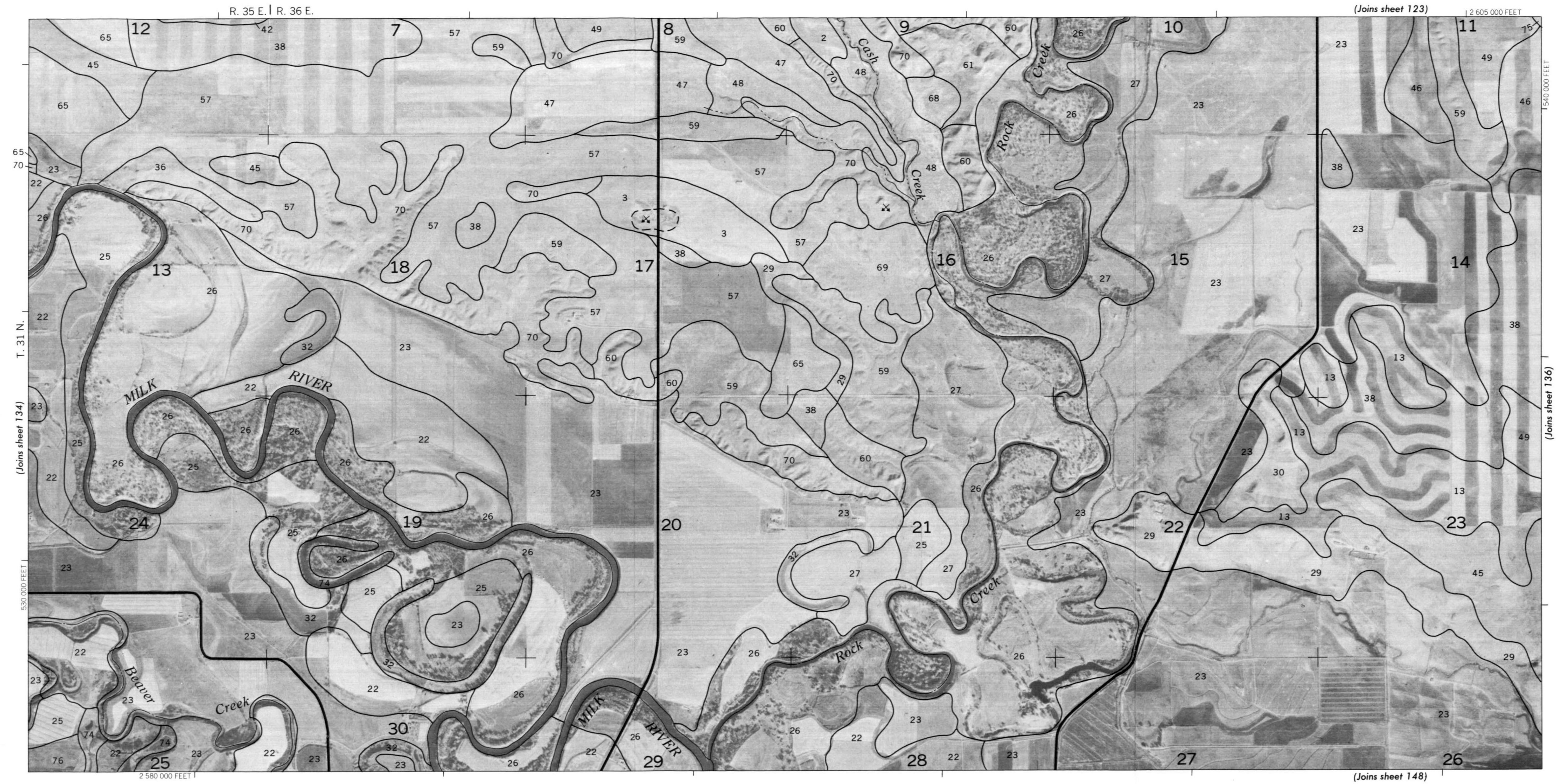


5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 134

N



VALLEY COUNTY, MONTANA NO. 135

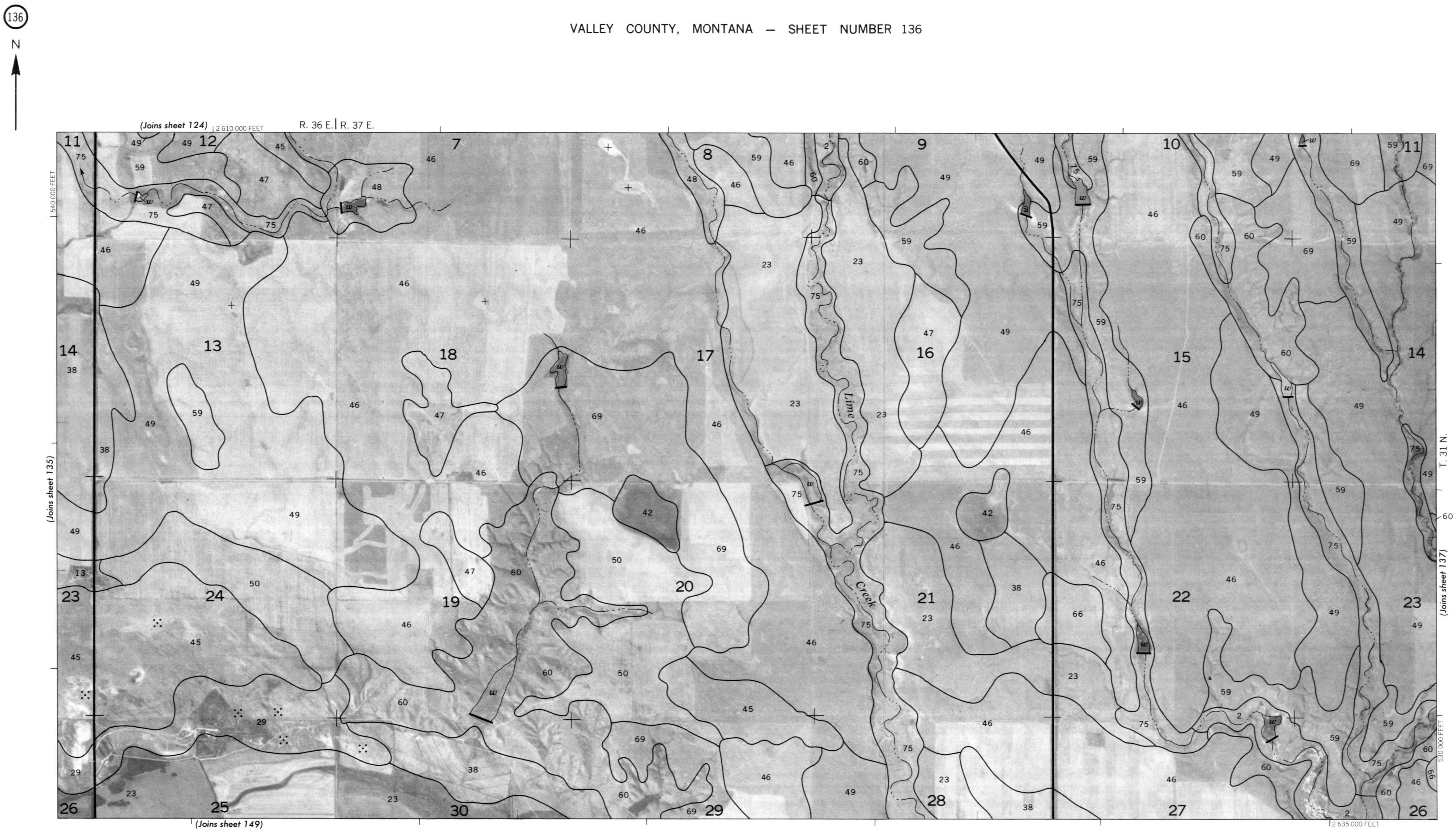
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 136



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of the Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 136

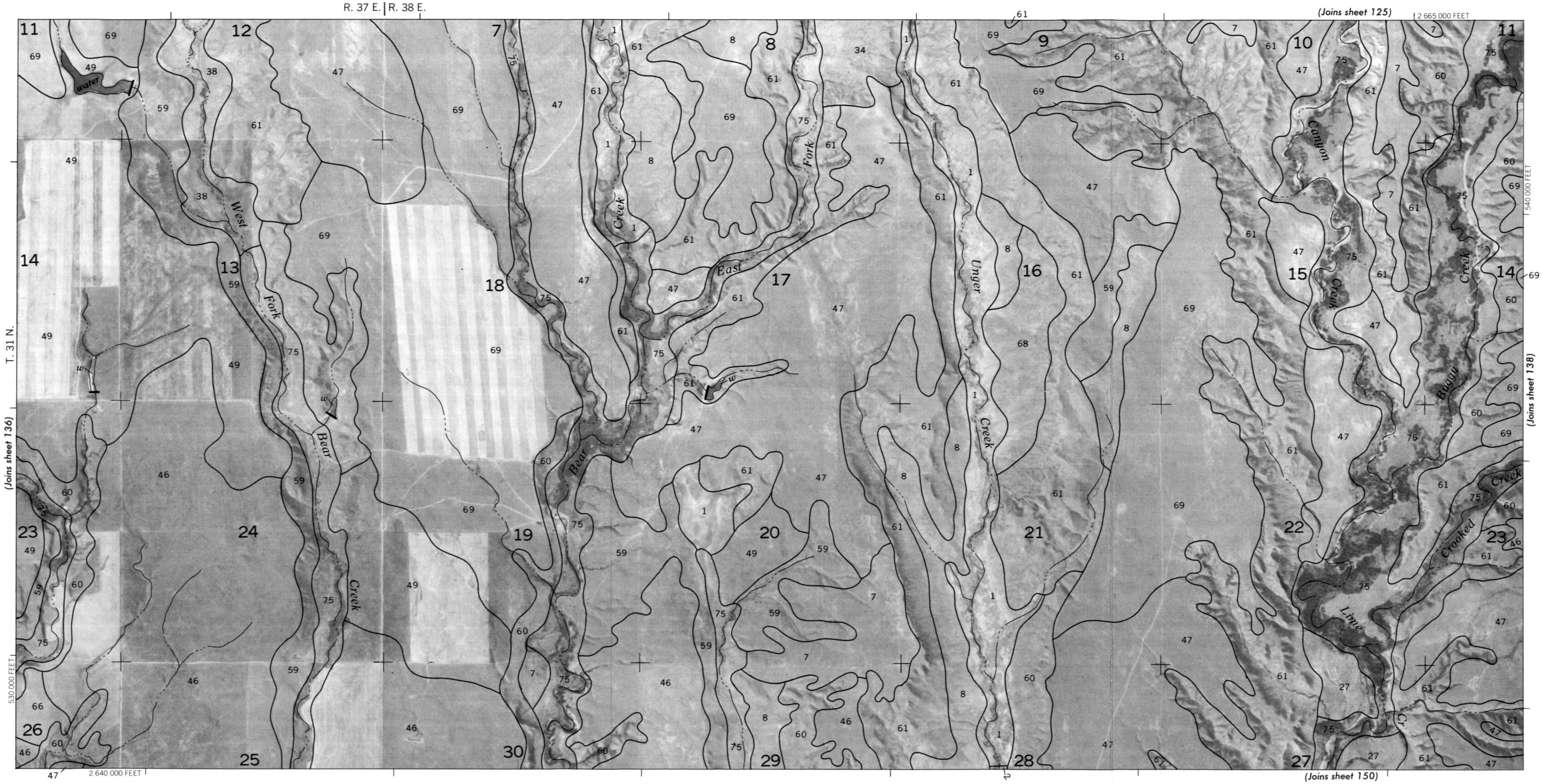
137

N

VALLEY COUNTY, MONTANA NO. 137

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



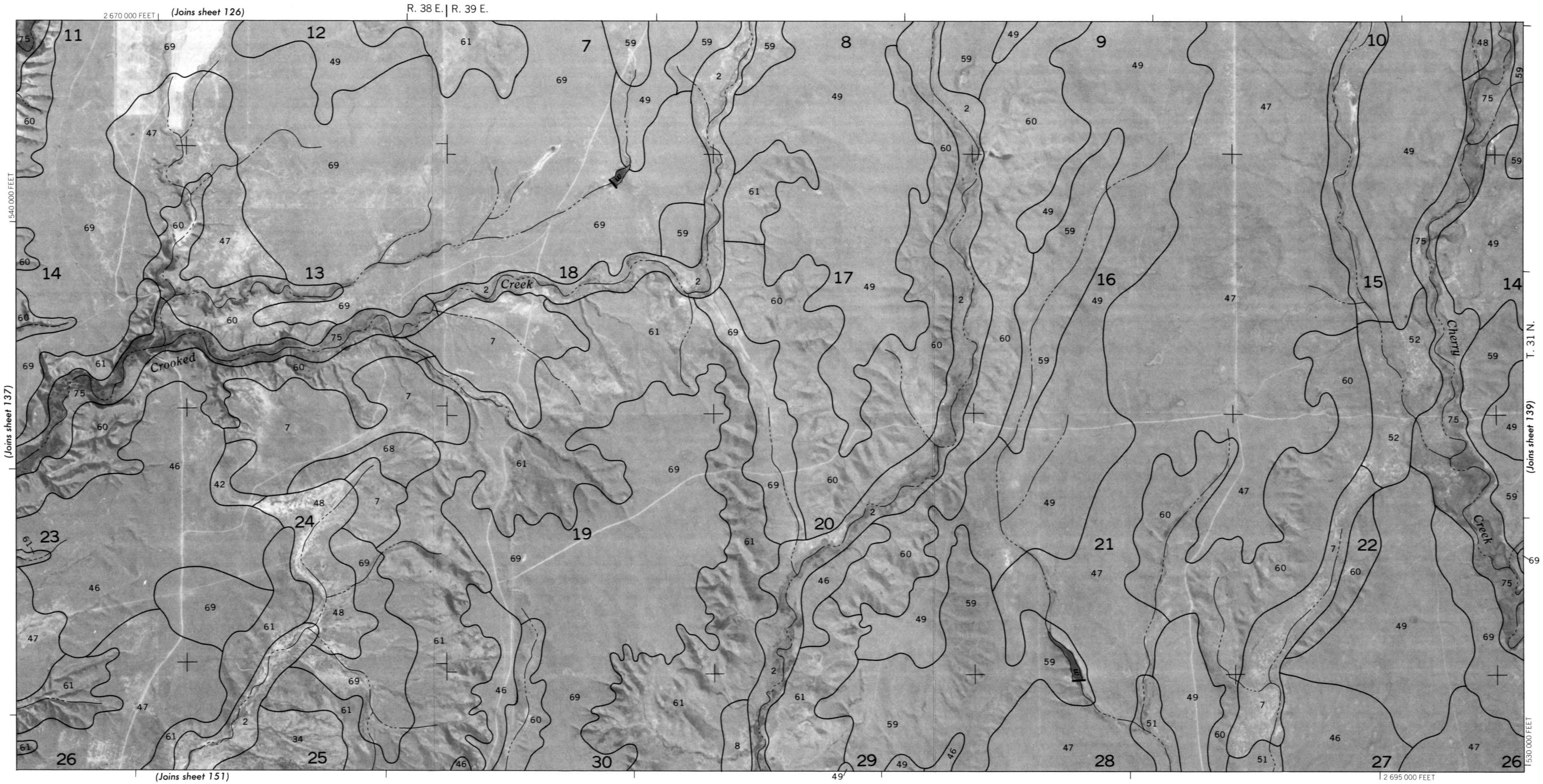
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 138



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

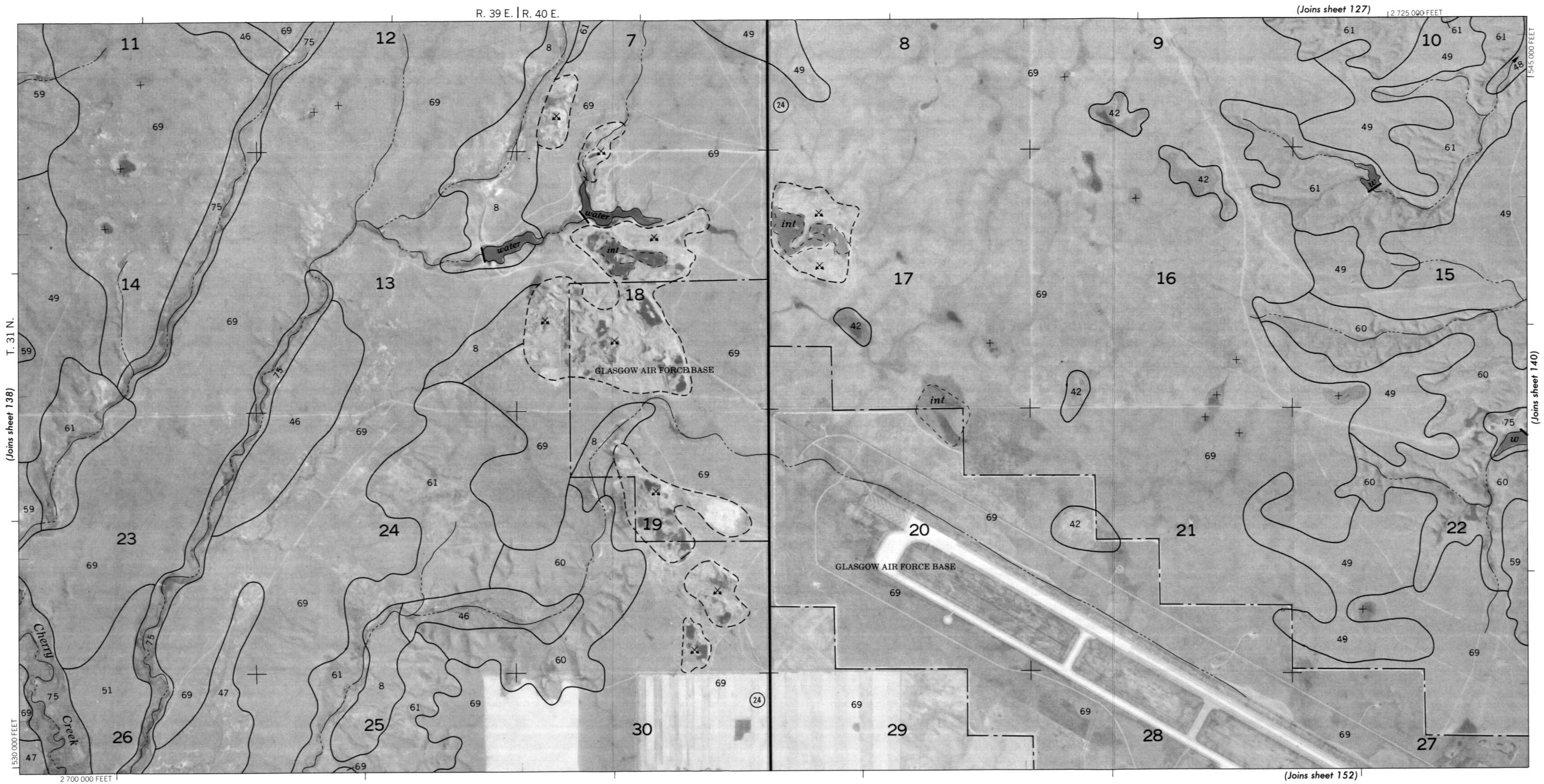
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 138

N

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



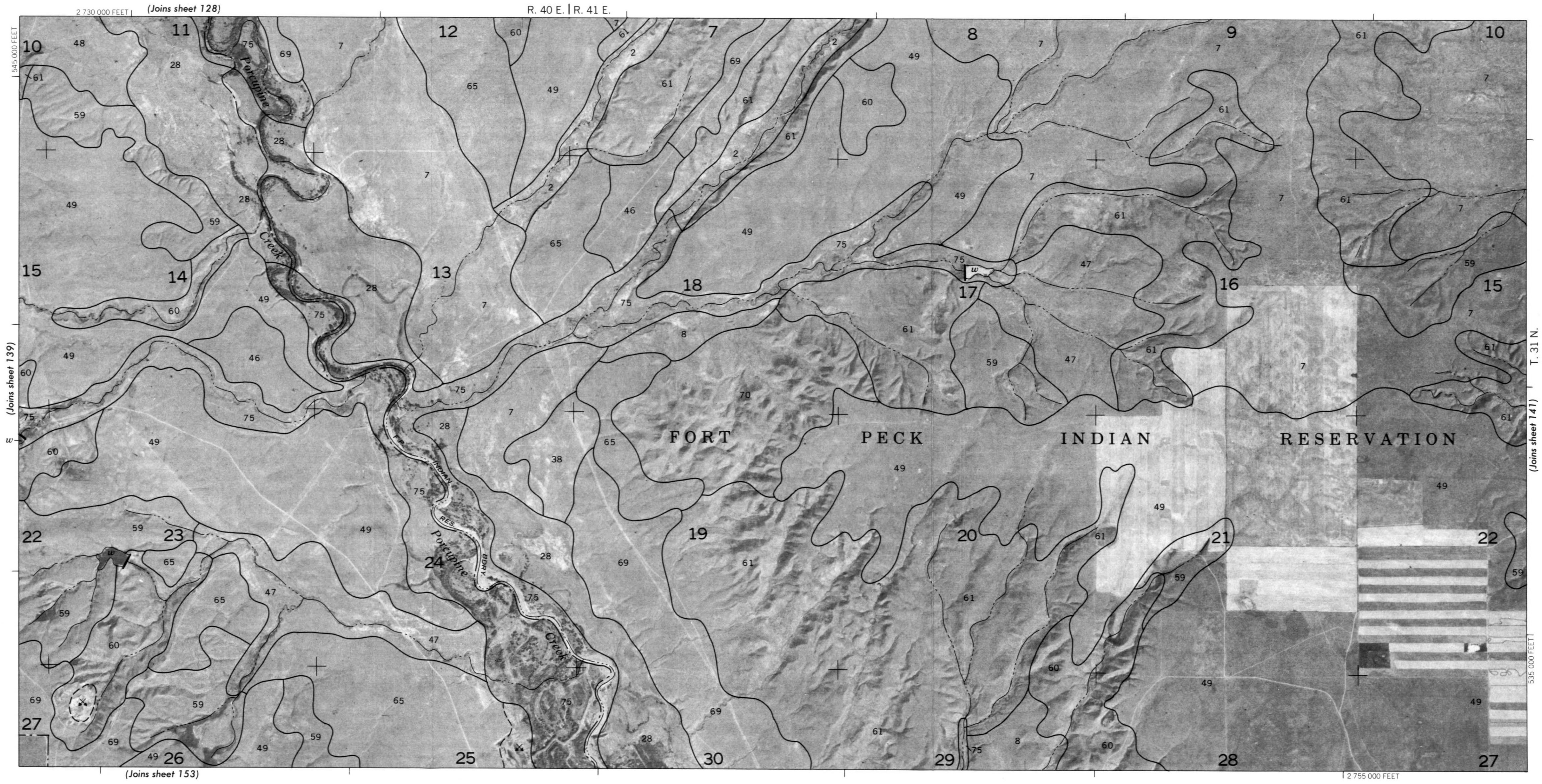
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 140



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

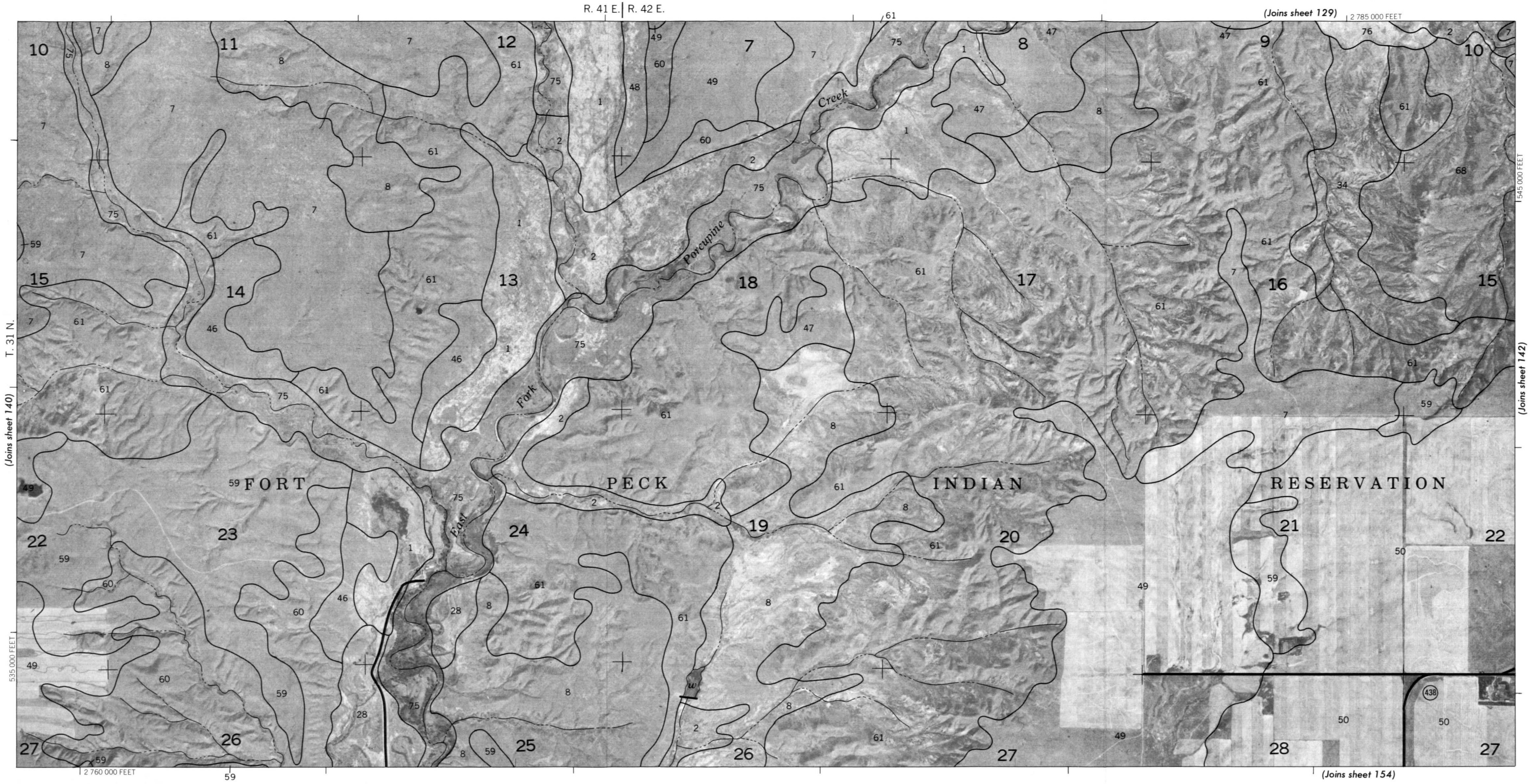
Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

141

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

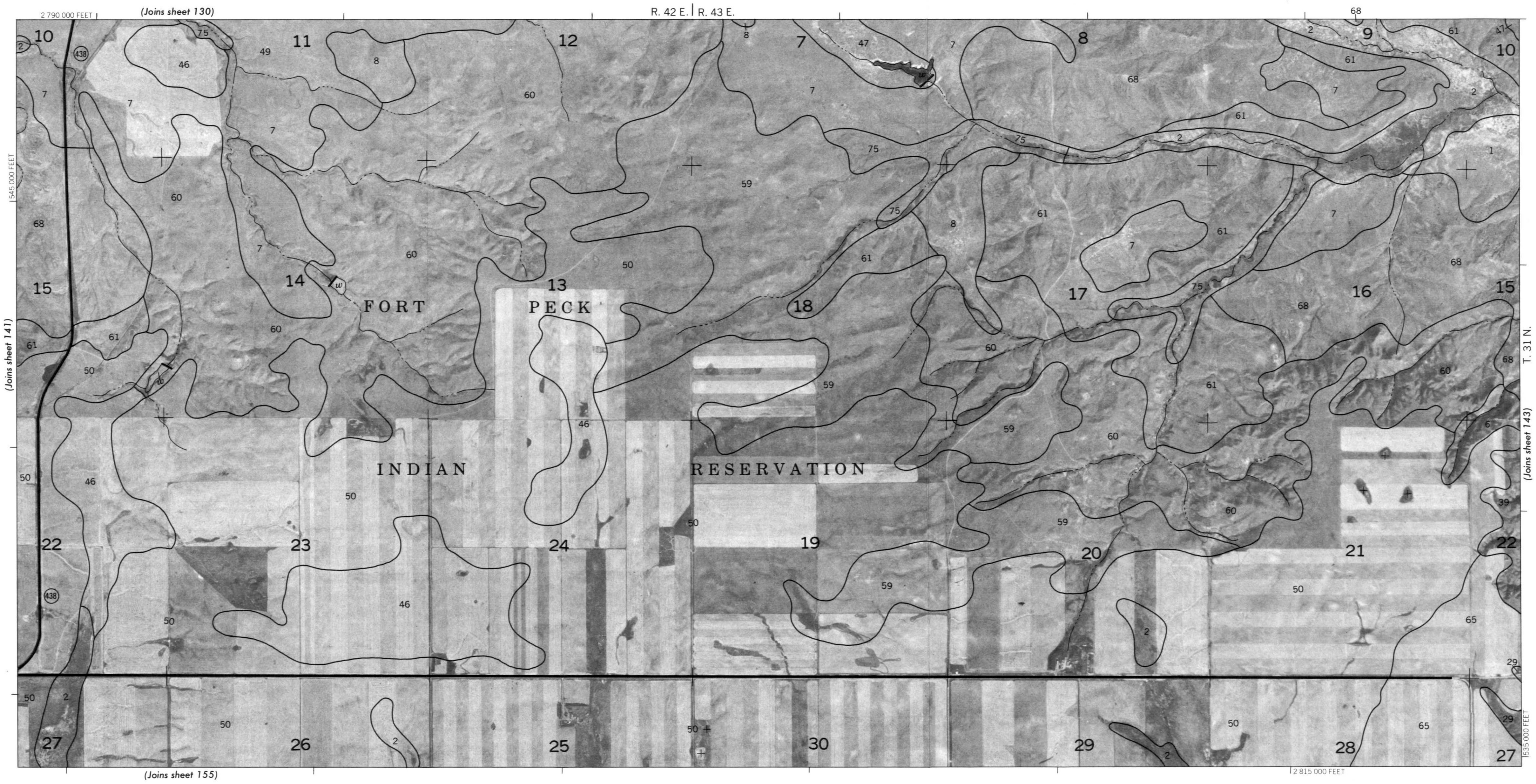
VALLEY COUNTY, MONTANA NO. 141

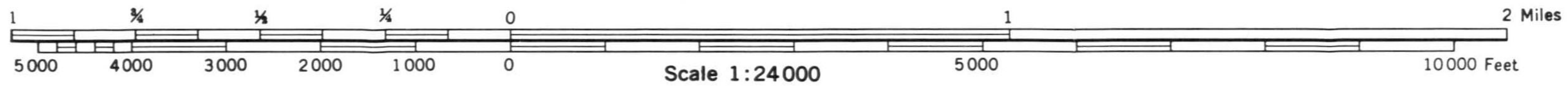
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

142

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 142





5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 142

VALLEY COUNTY, MONTANA — SHEET NUMBER 143

143

N

VALLEY COUNTY, MONTANA NO. 143

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

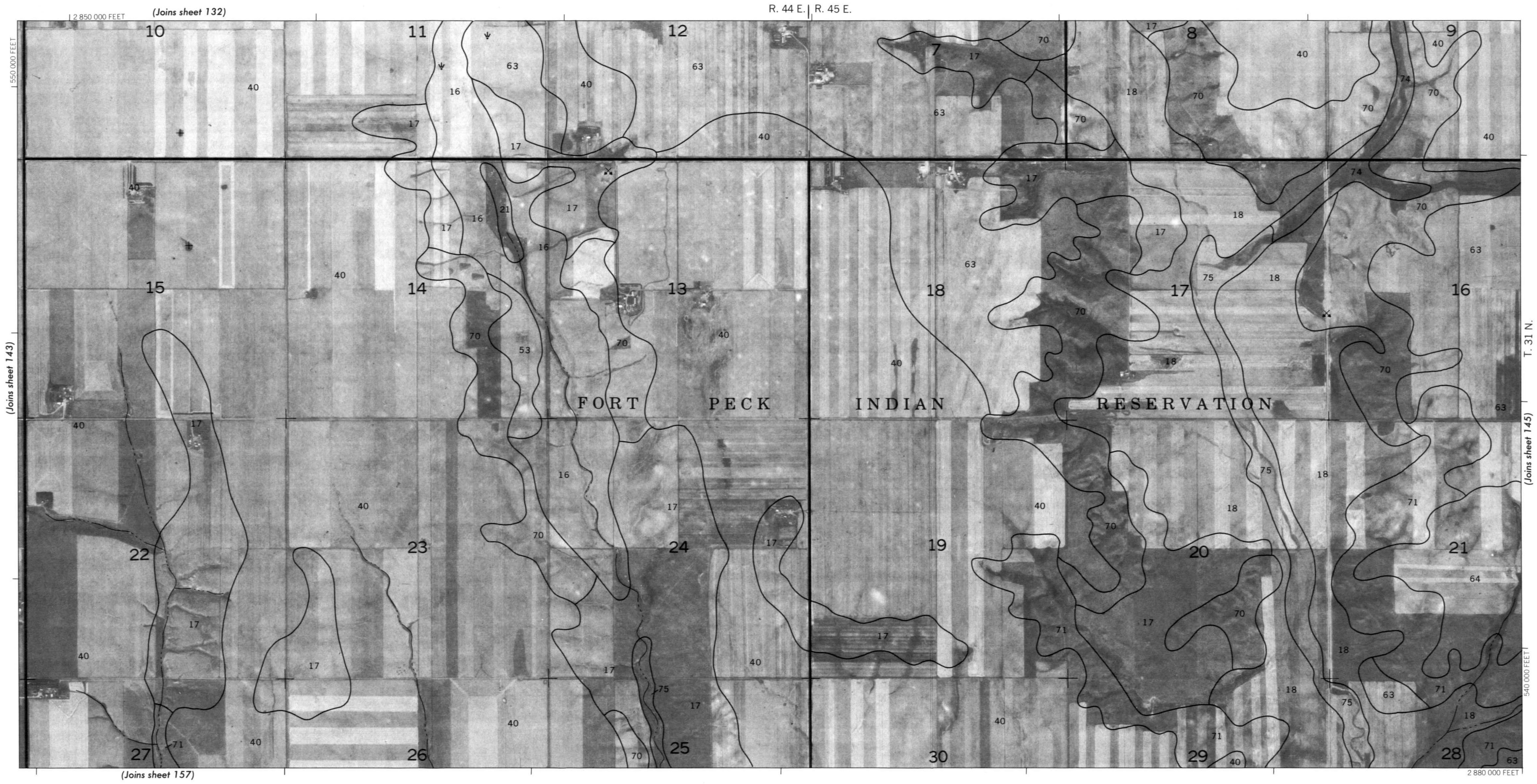
5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

Scale 1:24 000

(144)

VALLEY COUNTY, MONTANA — SHEET NUMBER 144

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 144

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 145

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

146

VALLEY COUNTY, MONTANA — SHEET NUMBER 146

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

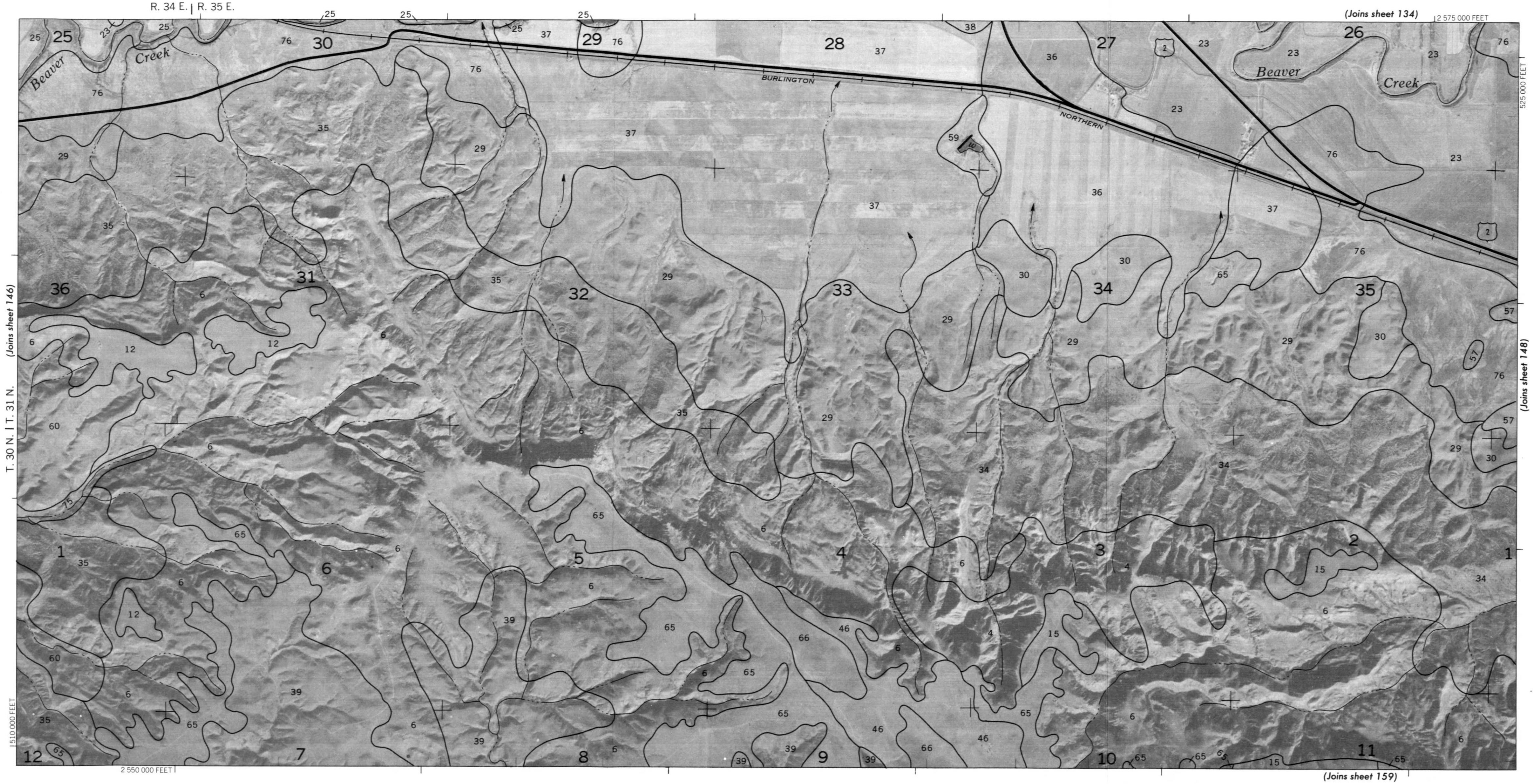
VALLEY COUNTY, MONTANA NO. 146

147

N

VALLEY COUNTY, MONTANA NO. 147

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

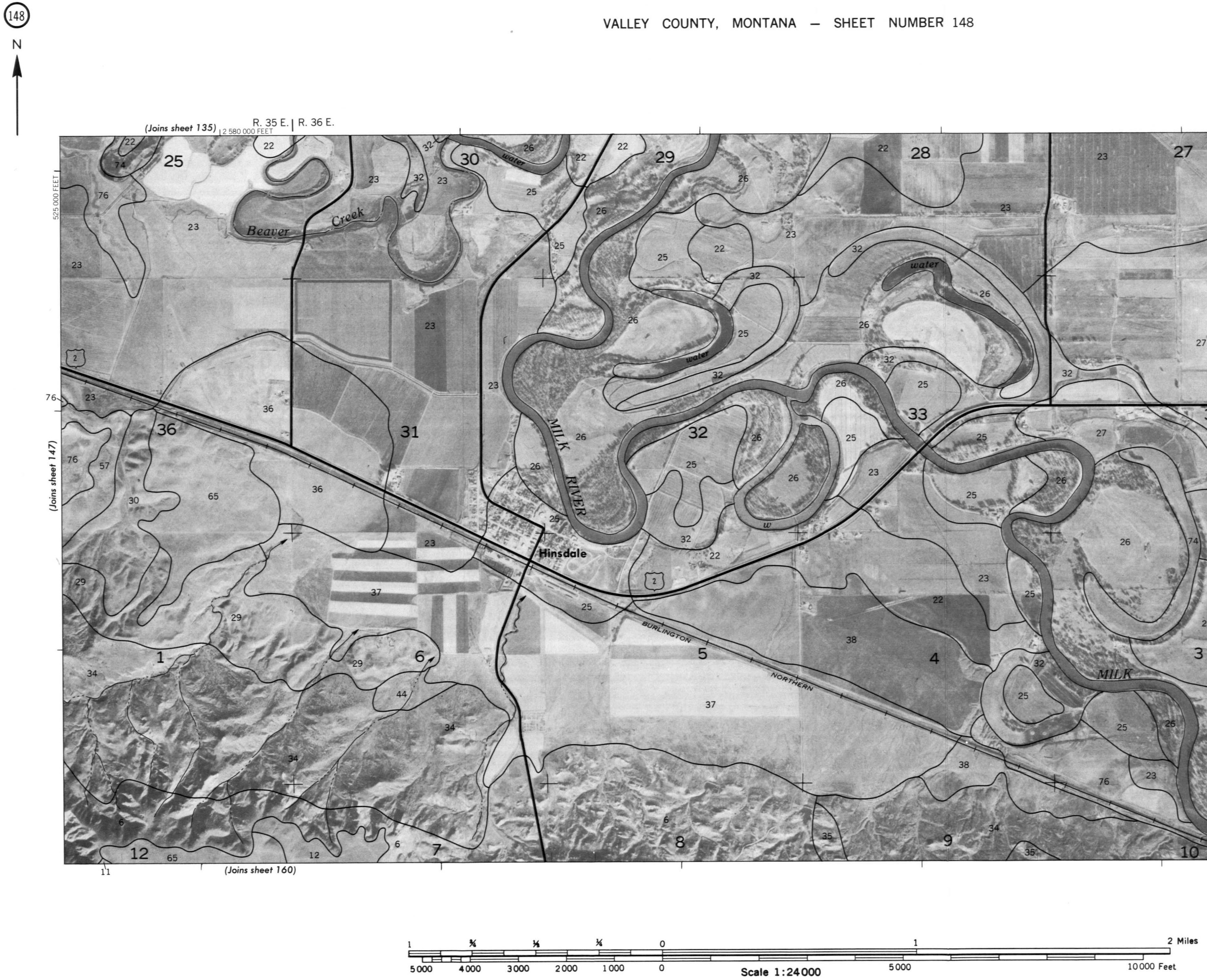


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 148



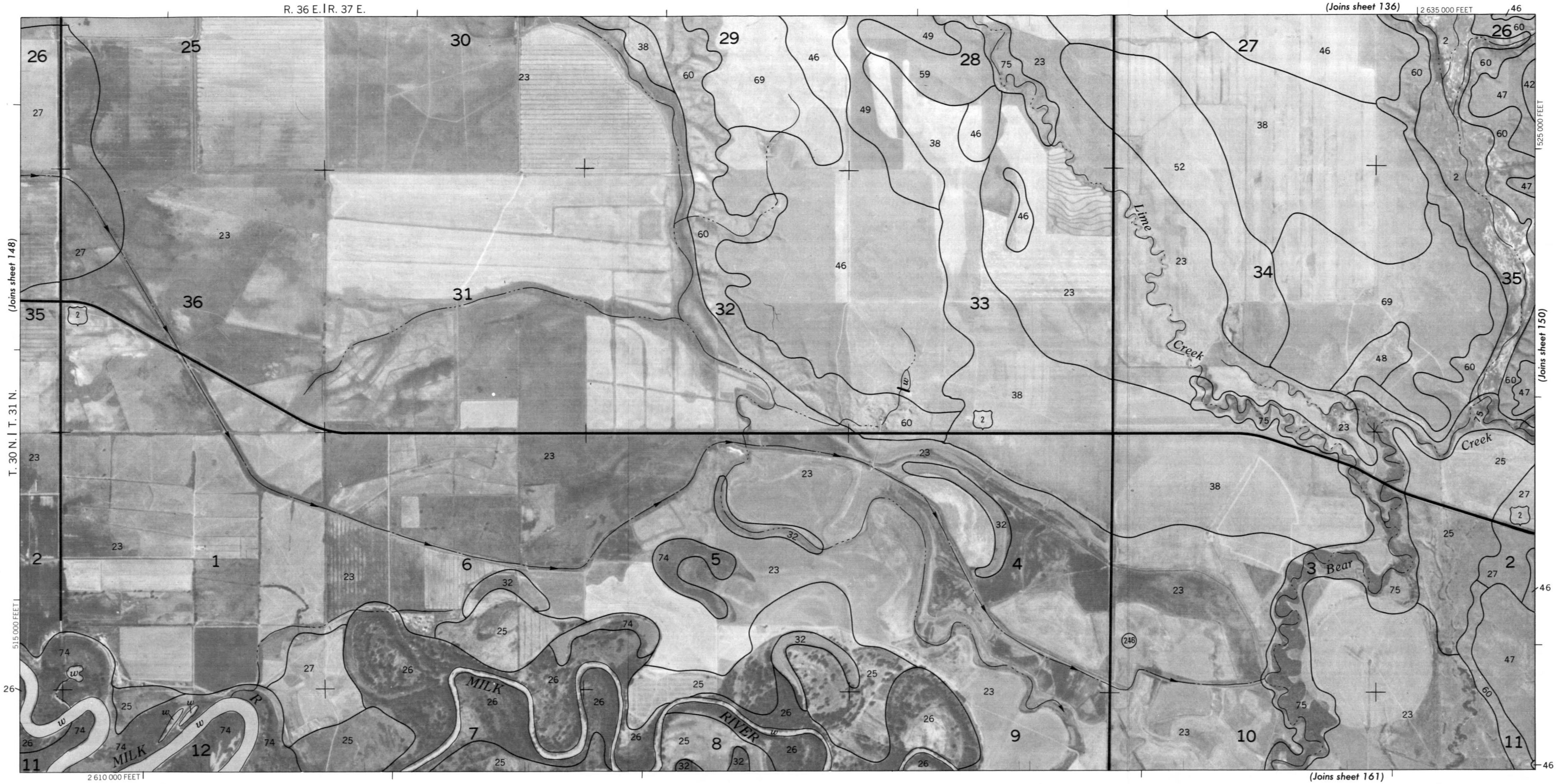
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 148

149

N



1	⅜	¼	⅛	0	1	2 Miles
5000	4000	3000	2000	1000	0	5000	10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 149

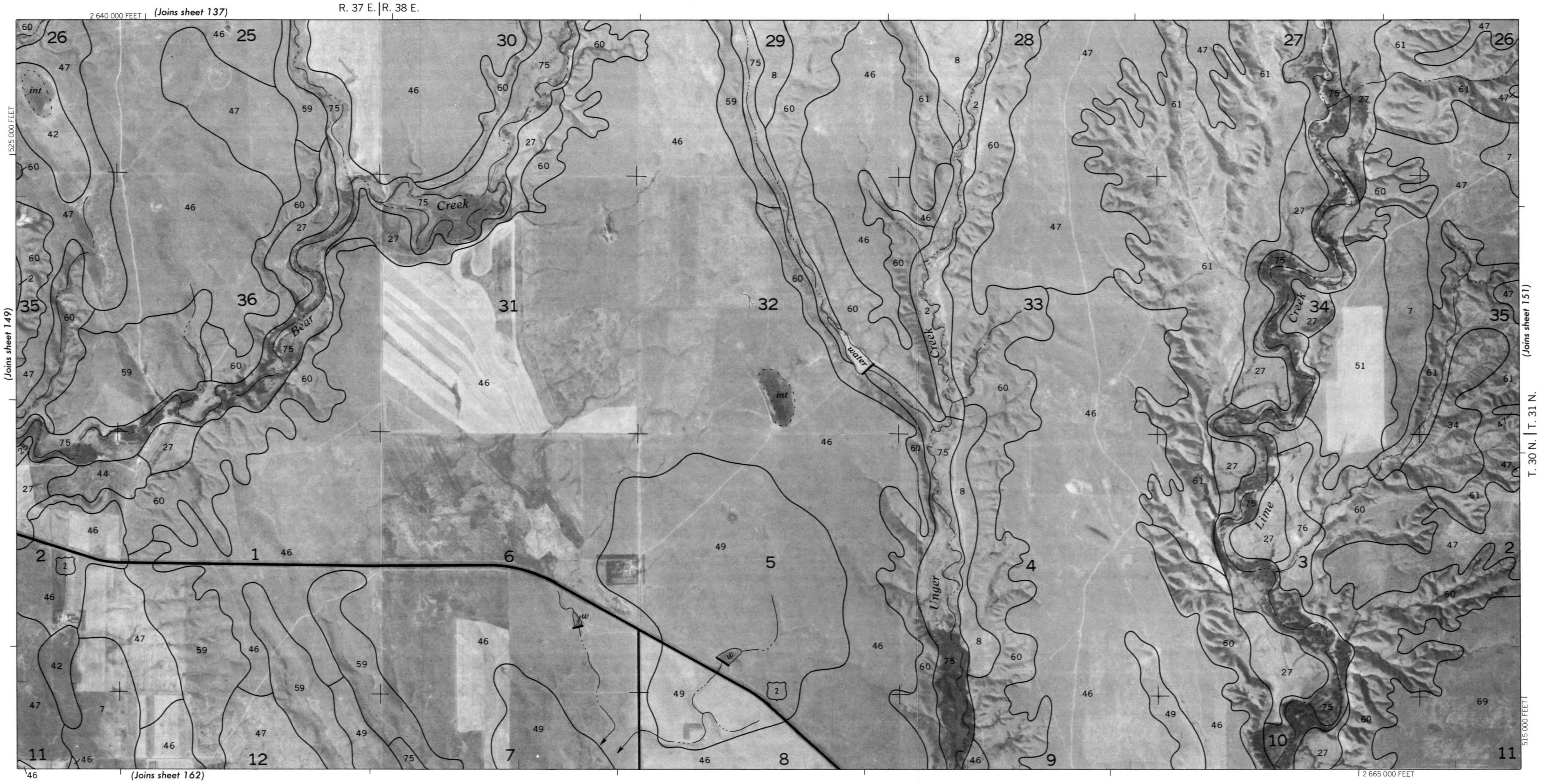
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

150

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 150



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24 000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

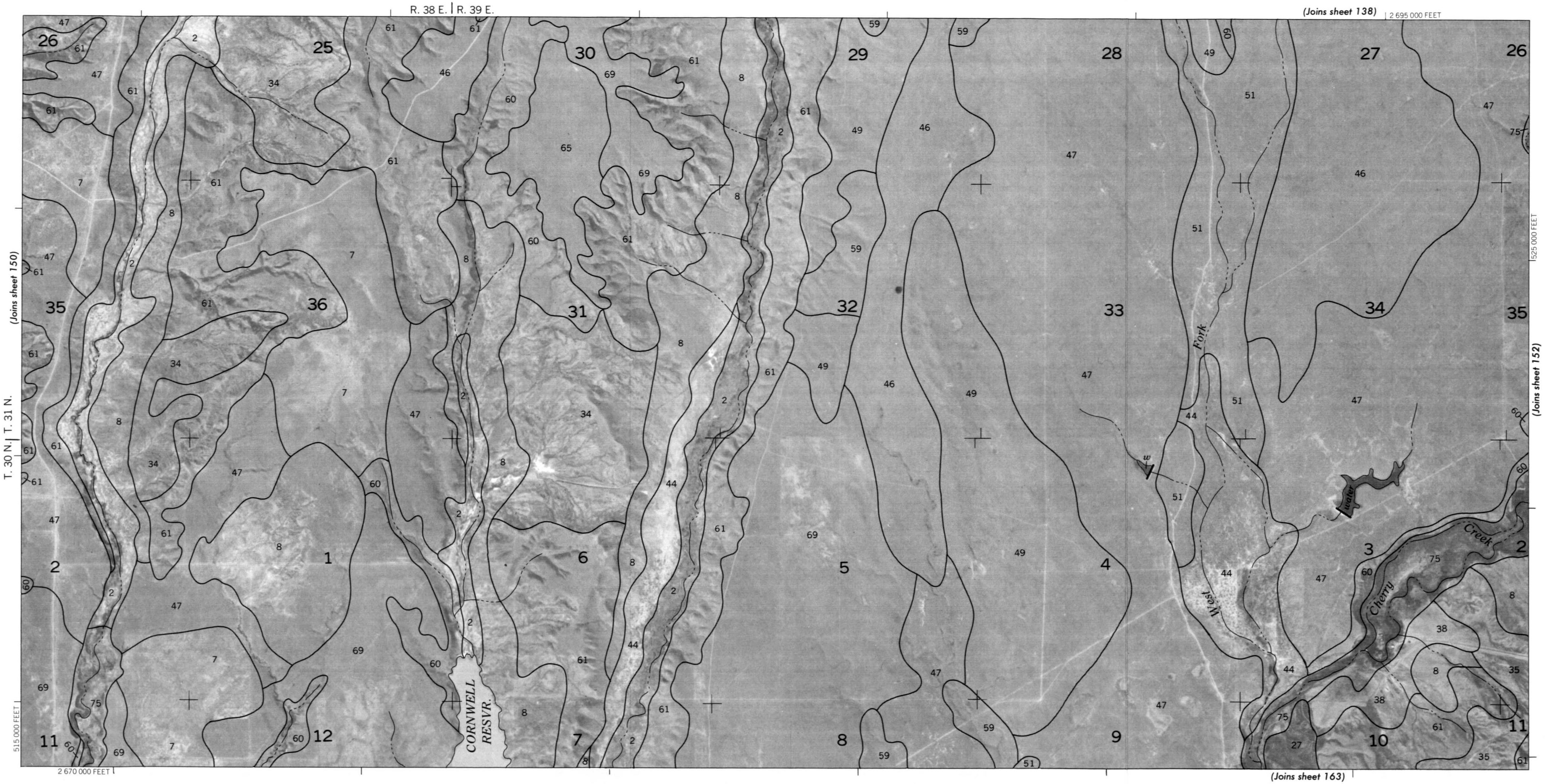
151

N

VALLEY COUNTY, MONTANA NO. 151

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

VALLEY COUNTY, MONTANA — SHEET NUMBER 152

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 152

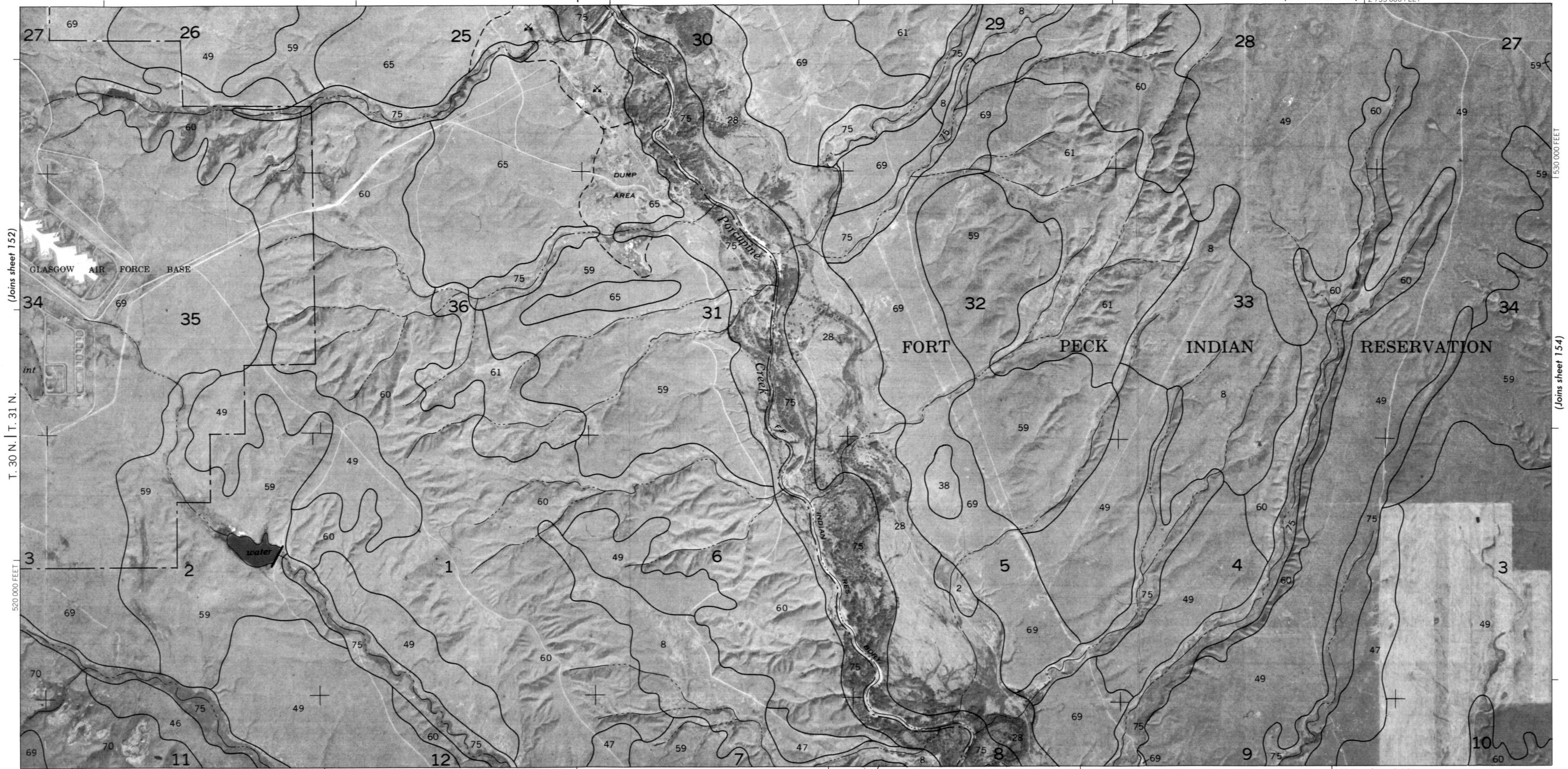
N

VALLEY COUNTY, MONTANA NO. 153

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

R. 40 E. | R. 41 E.

(Joins sheet 140)



(Joins sheet 165)

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 154

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

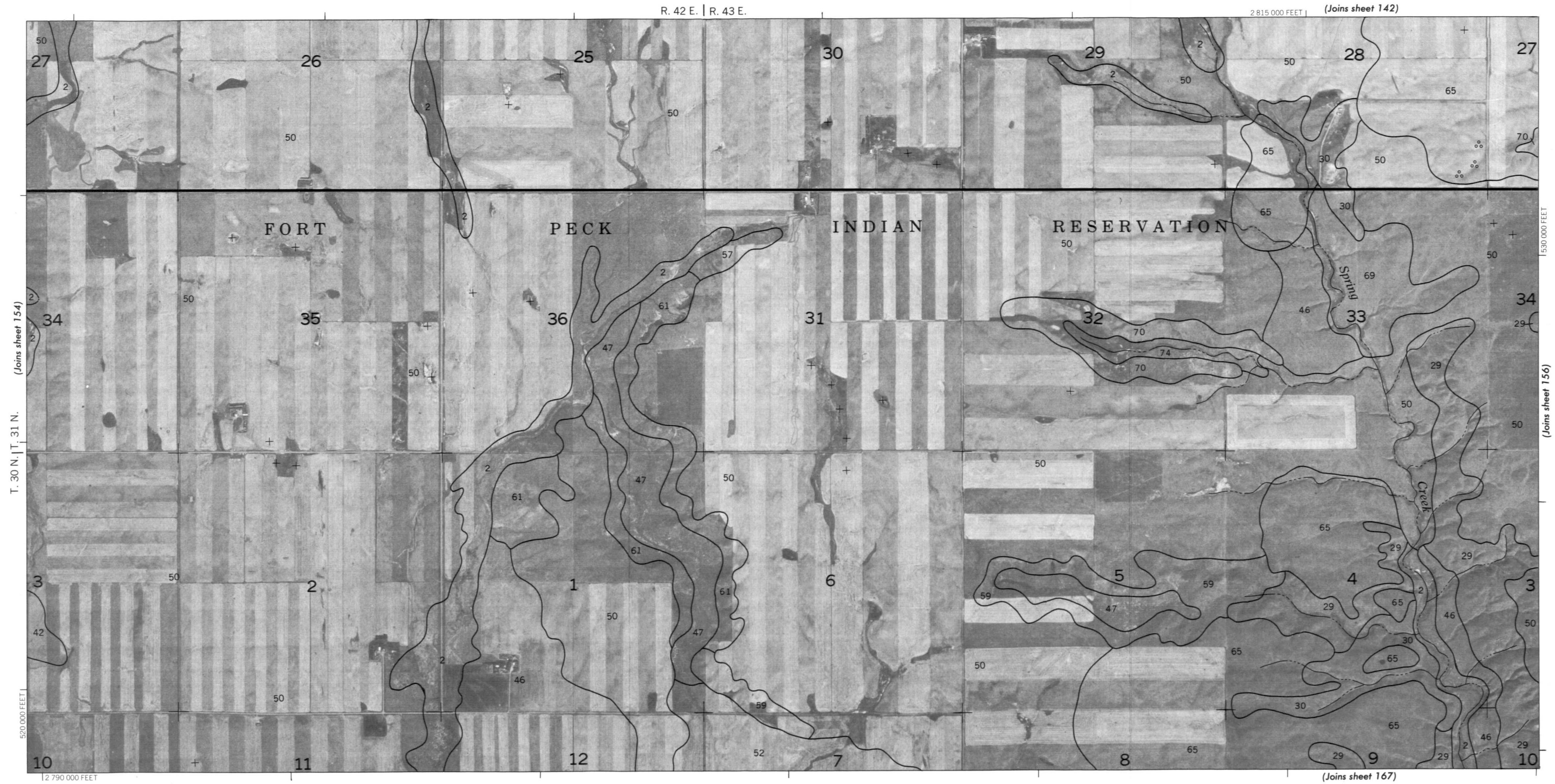
Scale 1:24000

5 000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of the Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 154

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

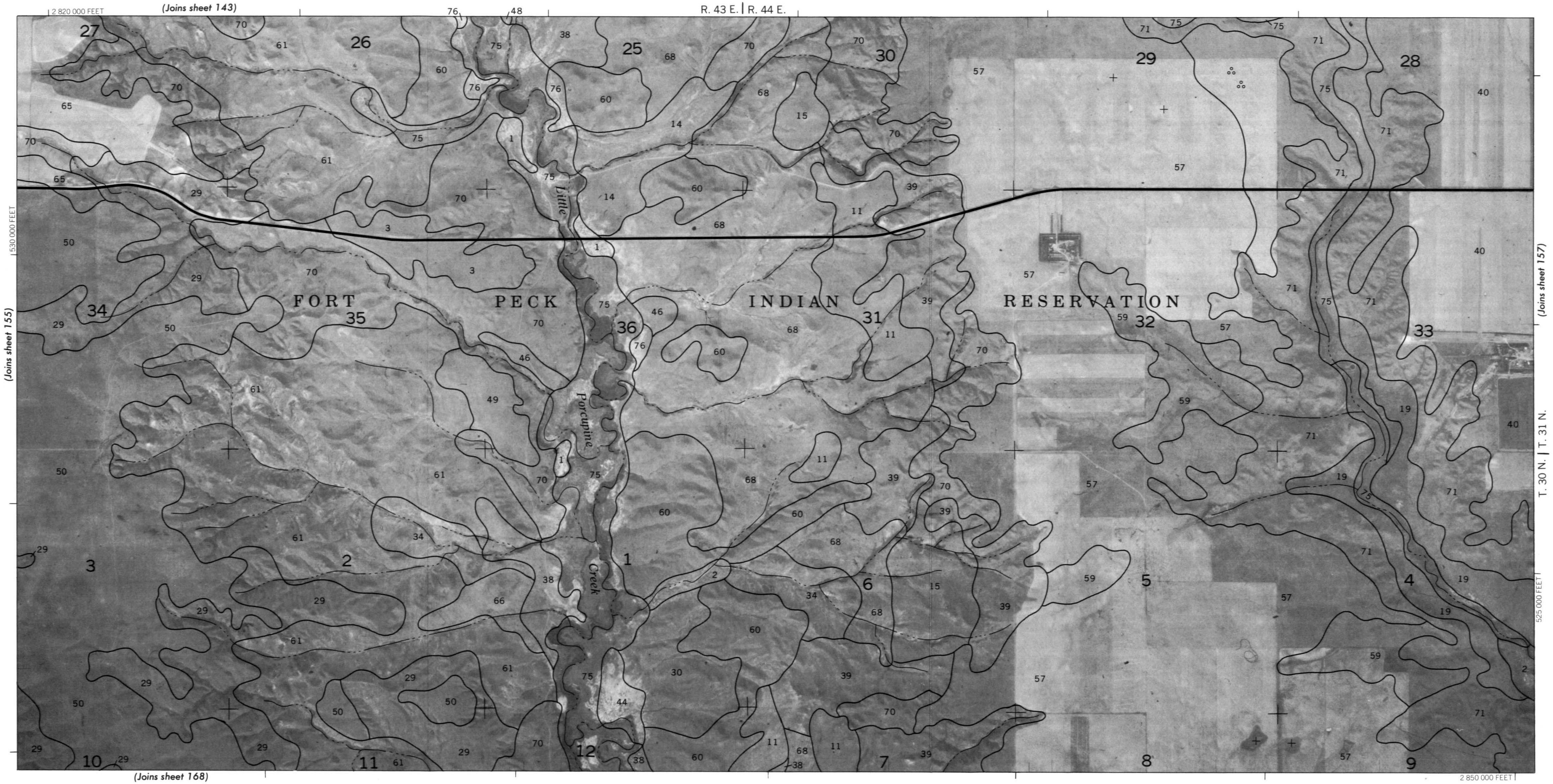
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 155

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 156



1 ¾ ½ ¼ 0 1 2 Miles

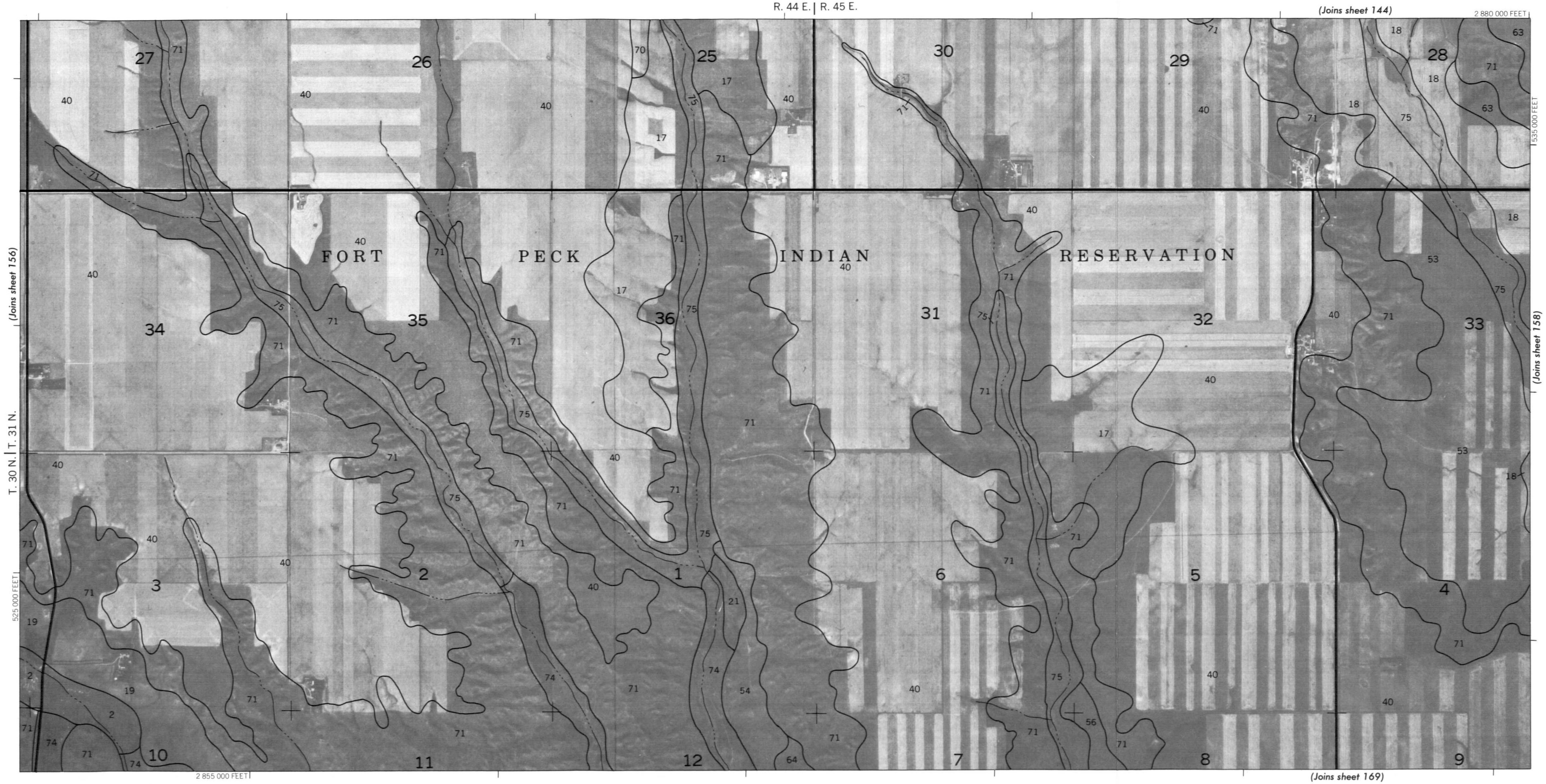
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 156

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

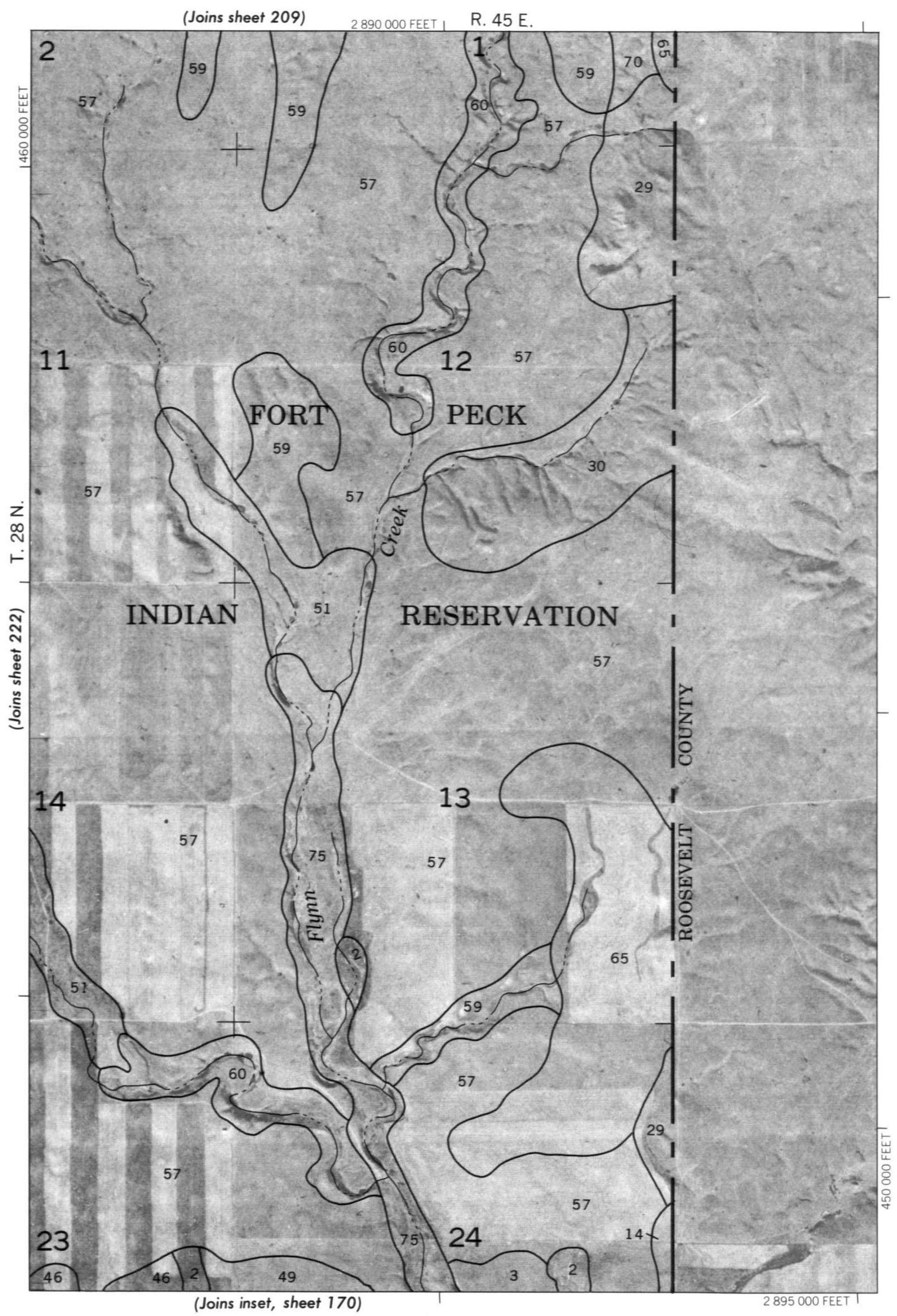
VALLEY COUNTY, MONTANA NO. 157

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 158



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

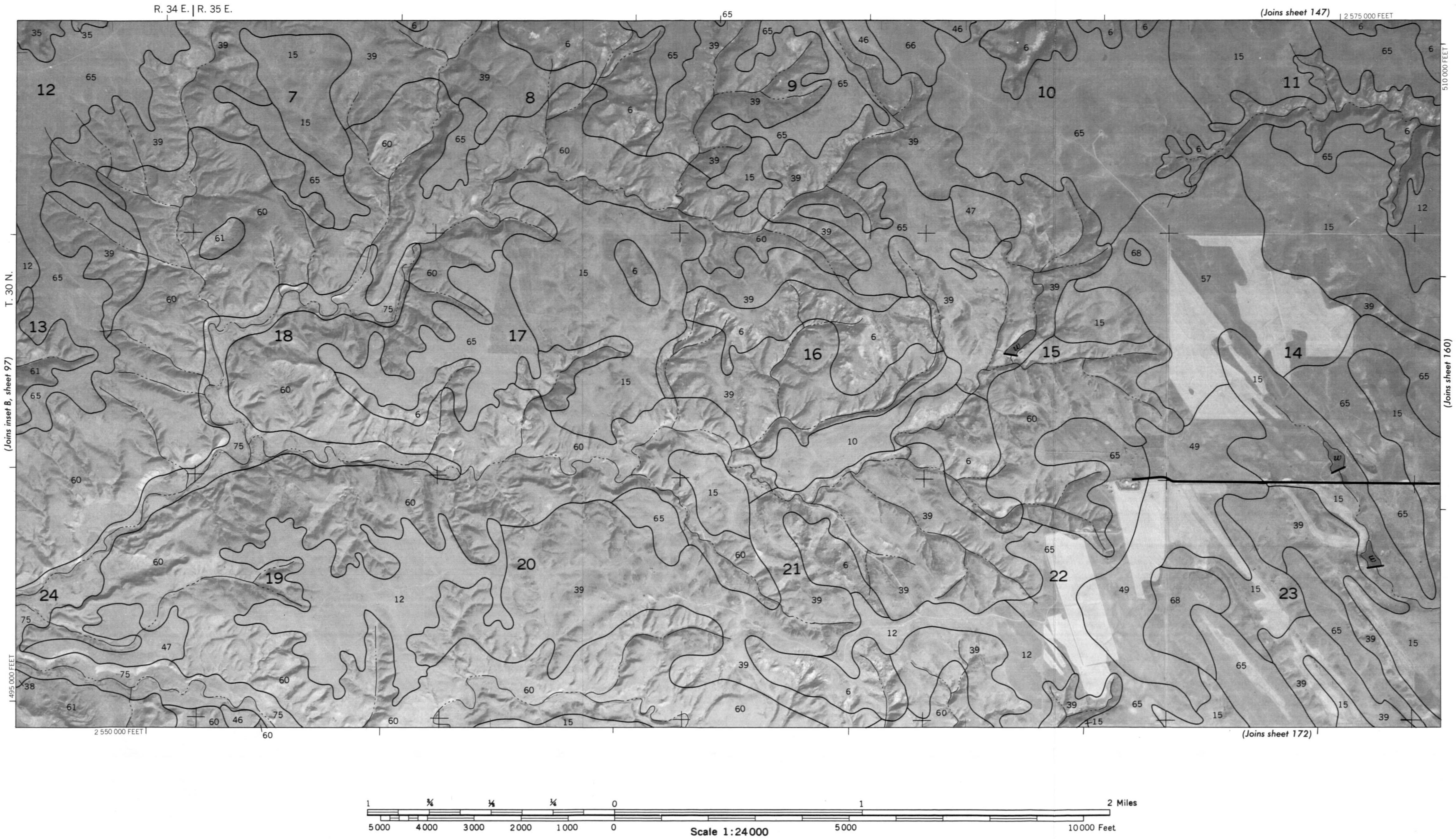
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

159

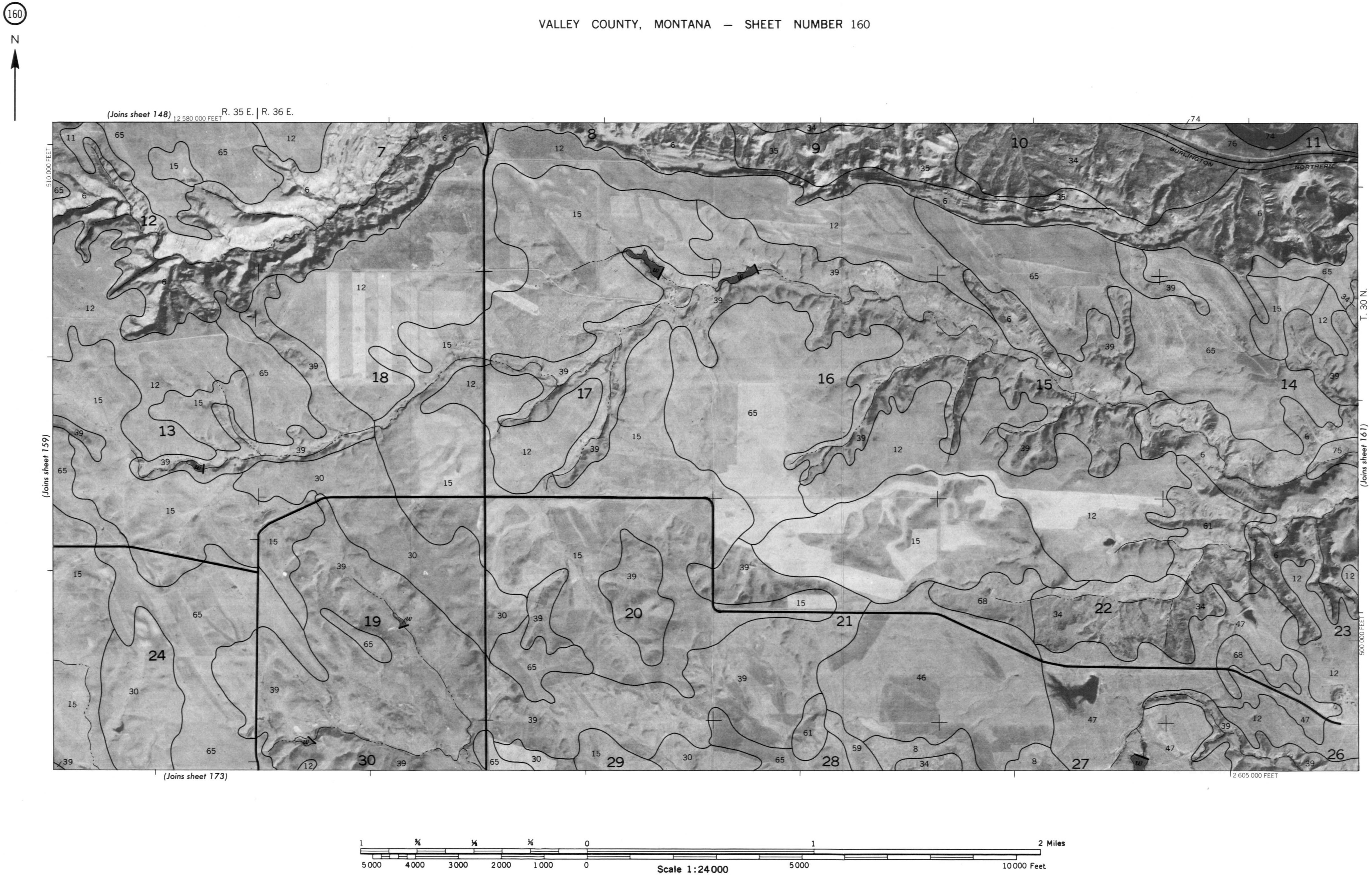
N

VALLEY COUNTY, MONTANA NO. 159

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



VALLEY COUNTY, MONTANA — SHEET NUMBER 160



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

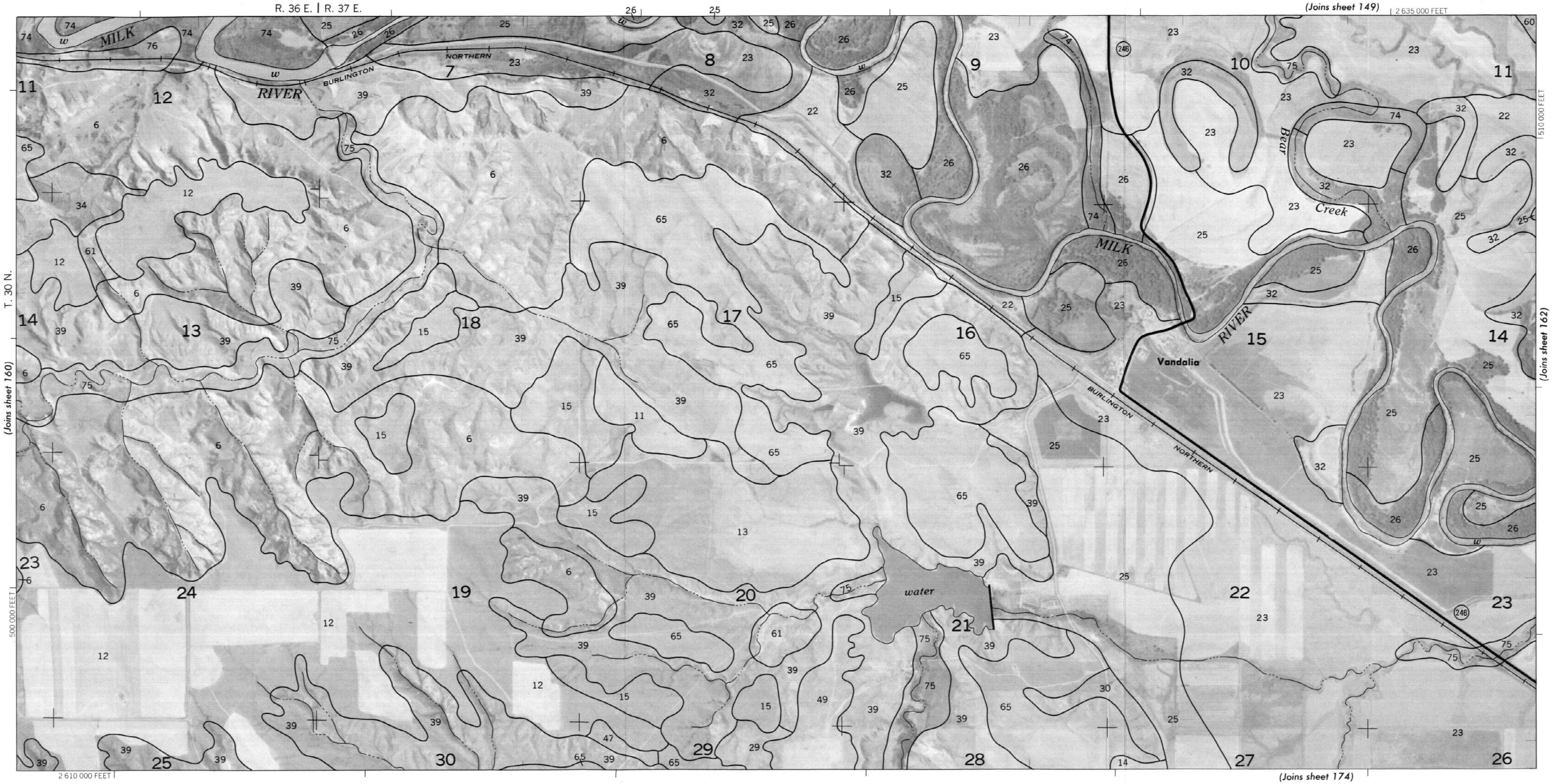
VALLEY COUNTY, MONTANA NO. 160

161

N

VALLEY COUNTY, MONTANA NO. 161

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

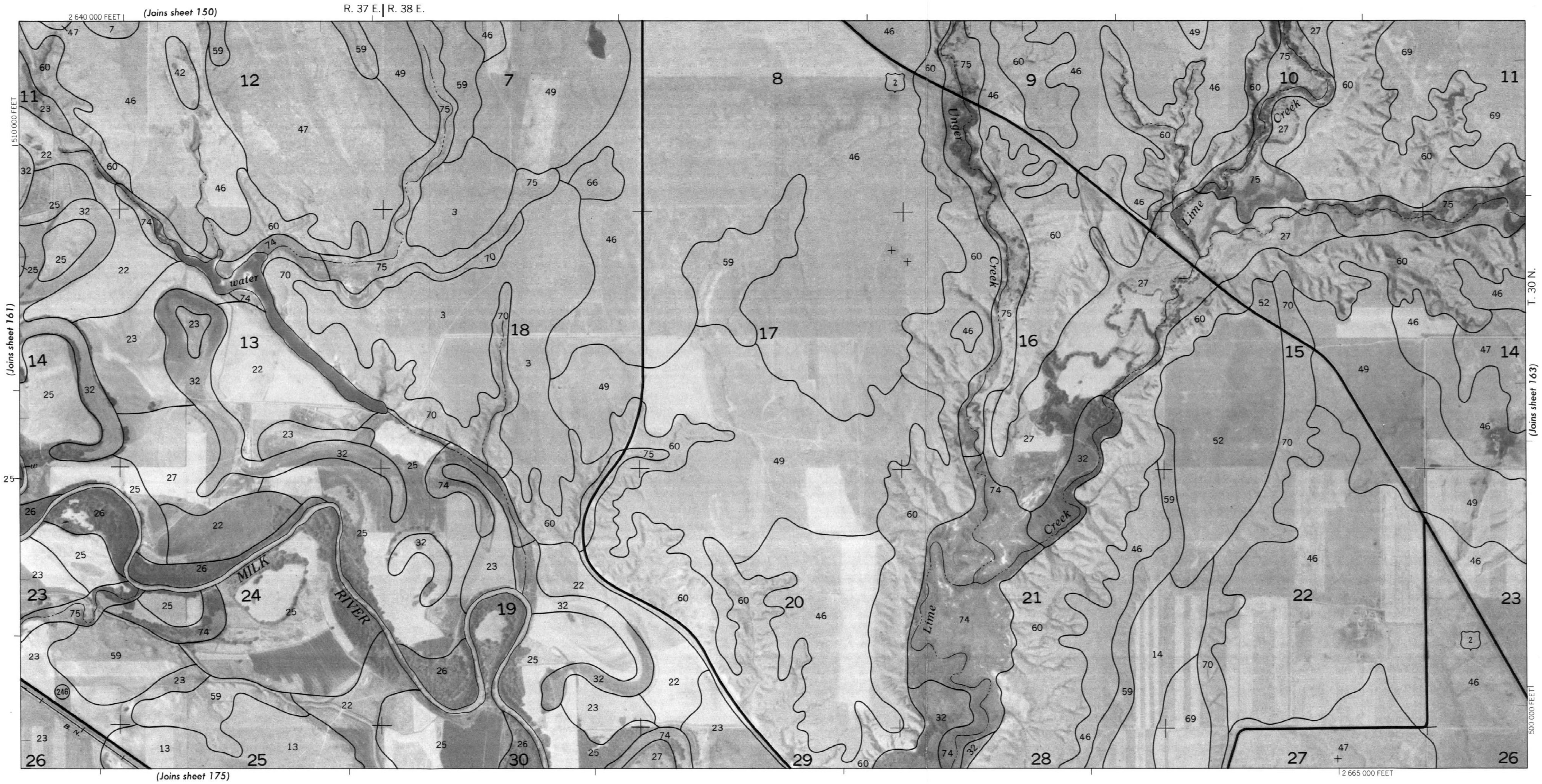


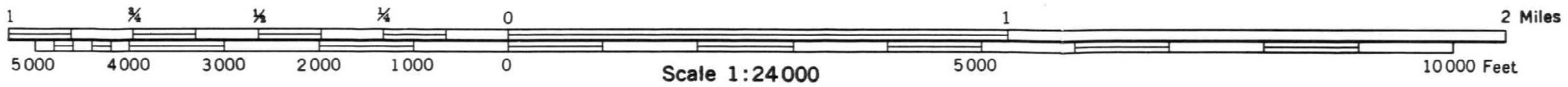
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 162





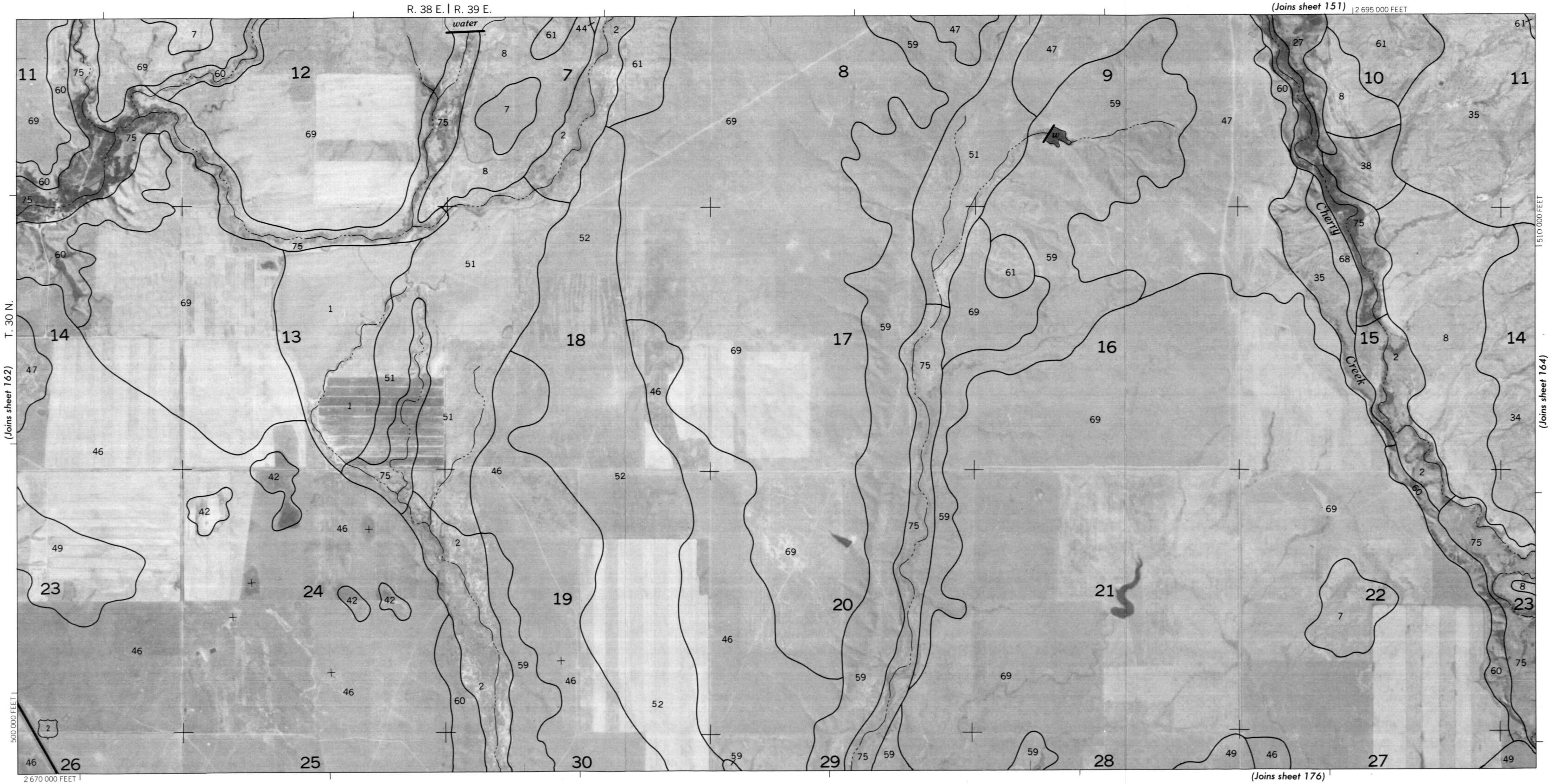
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

163

N



Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

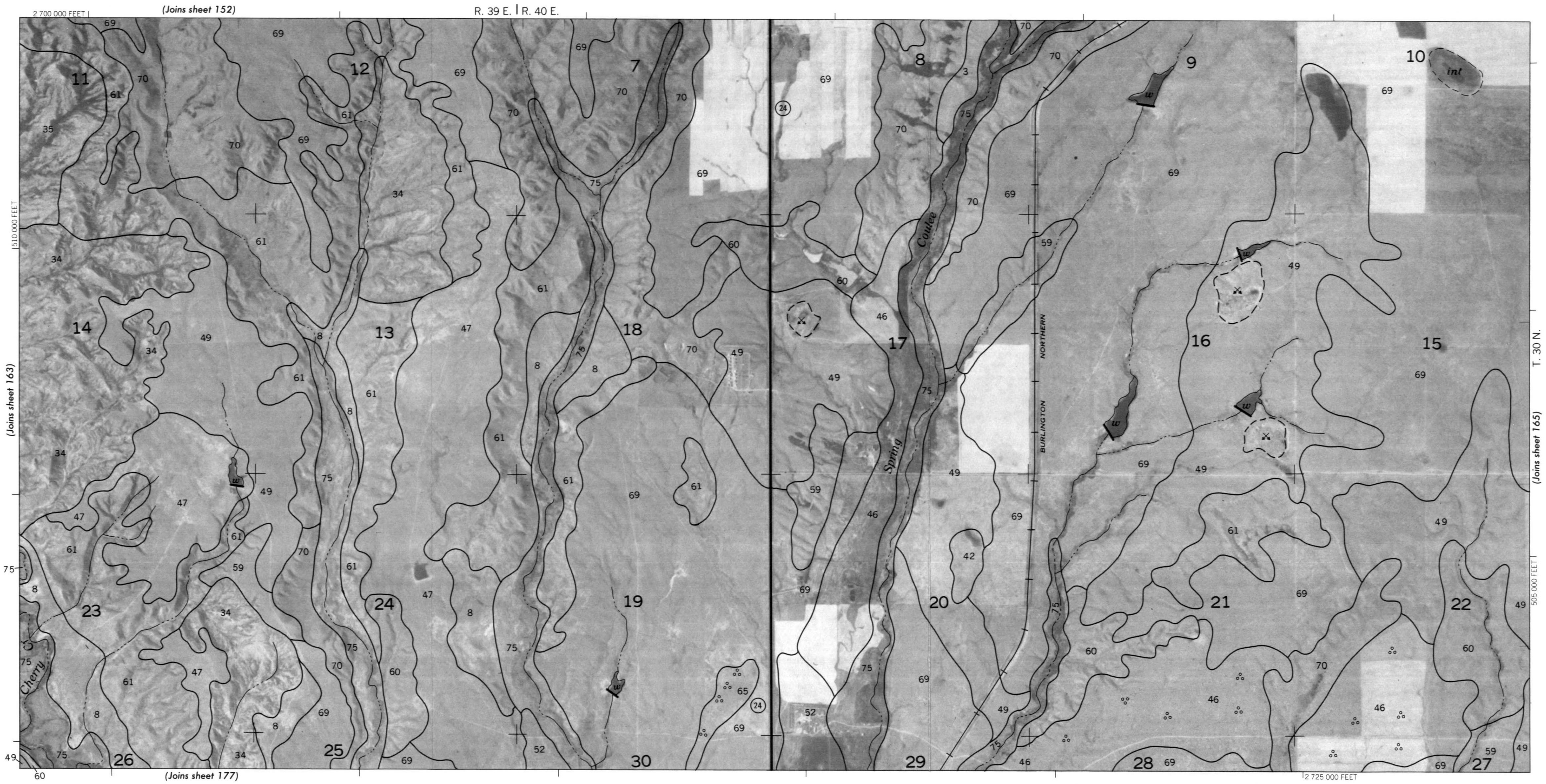
5000 4000 3000 2000 1000 0 5000 10000 Feet

VALLEY COUNTY, MONTANA NO. 163

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 164



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

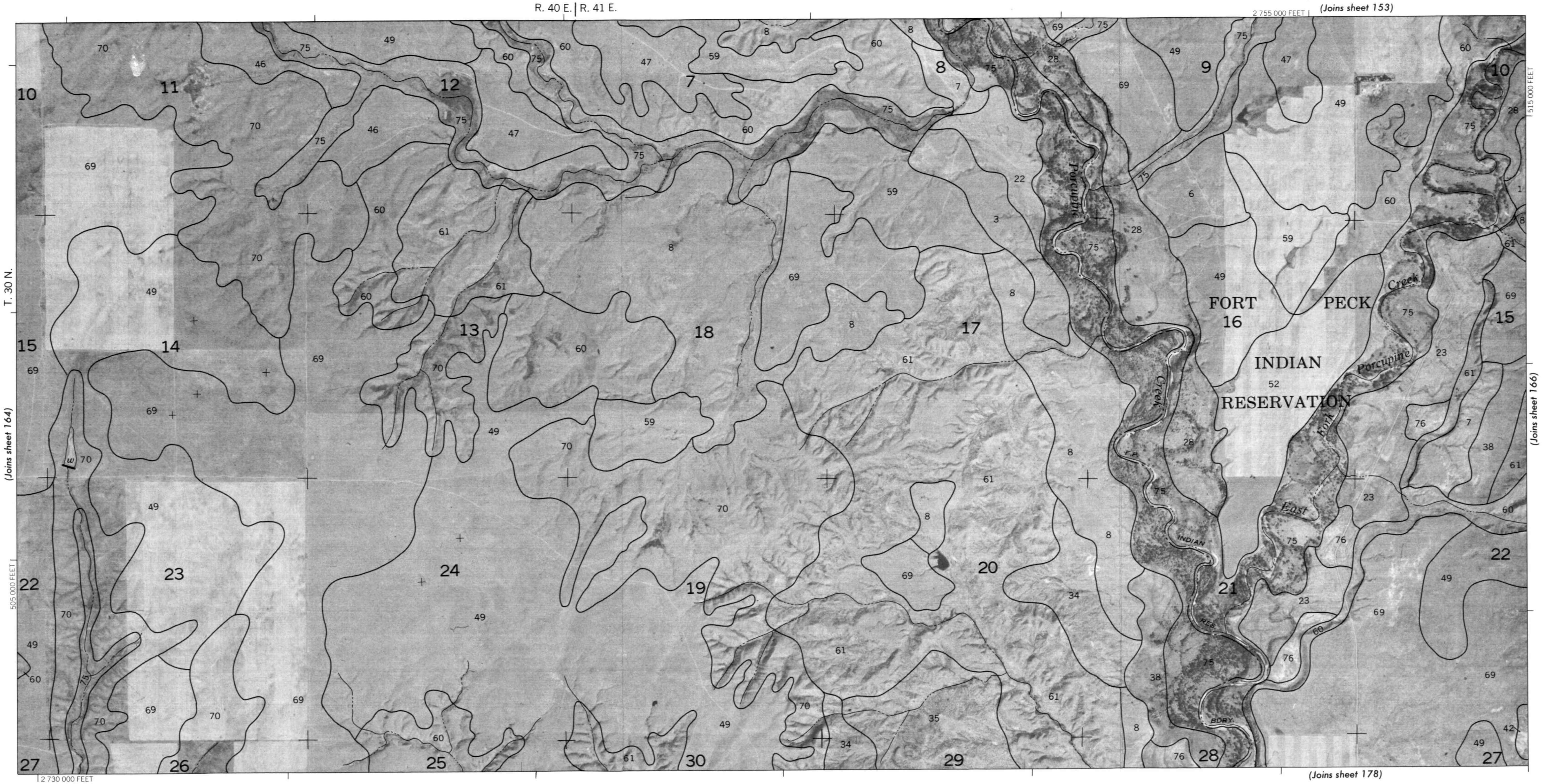
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

165

N



1 ¾ ½ ¼ 0 1 2 Miles

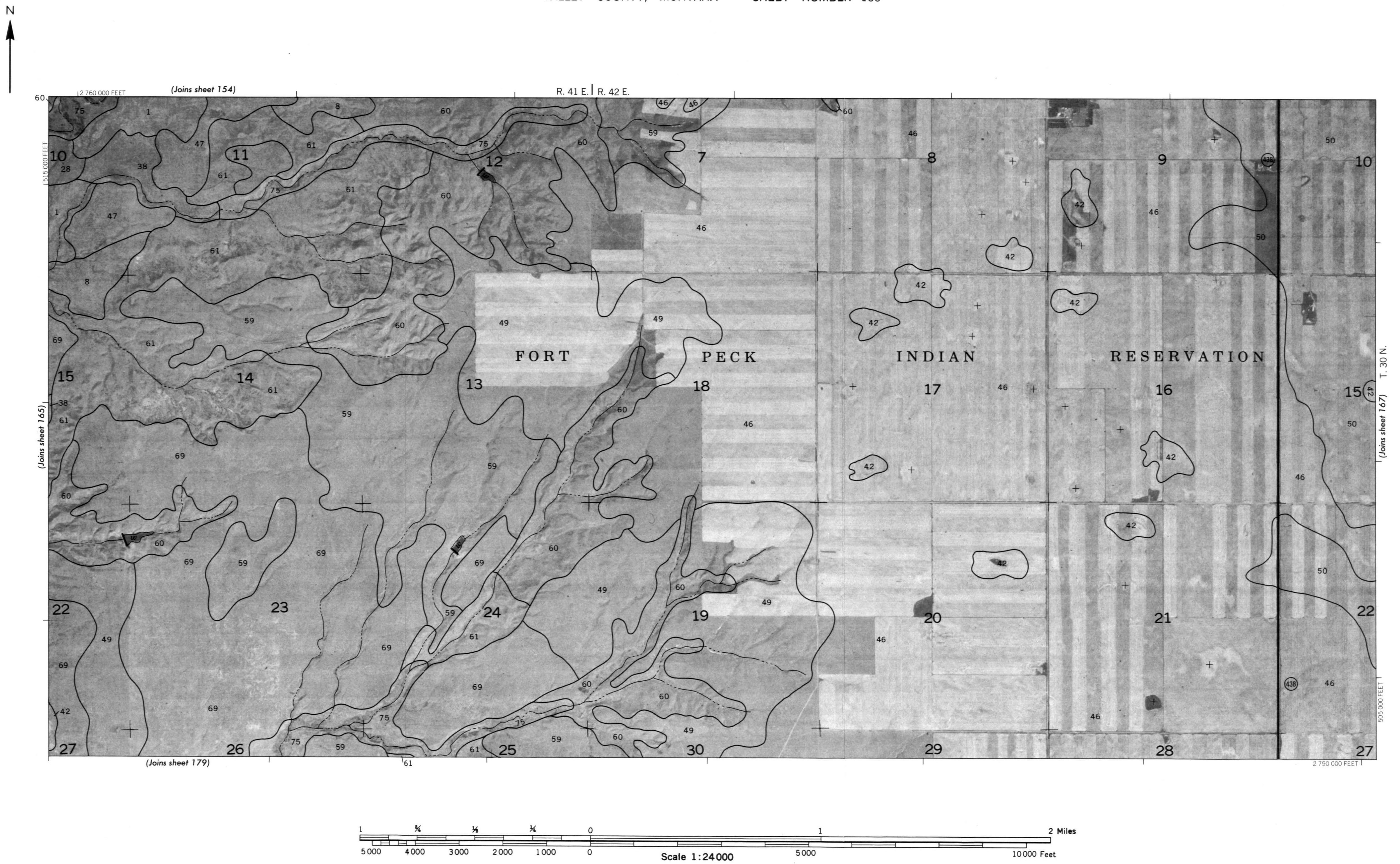
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24 000

VALLEY COUNTY, MONTANA NO. 165

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 166



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

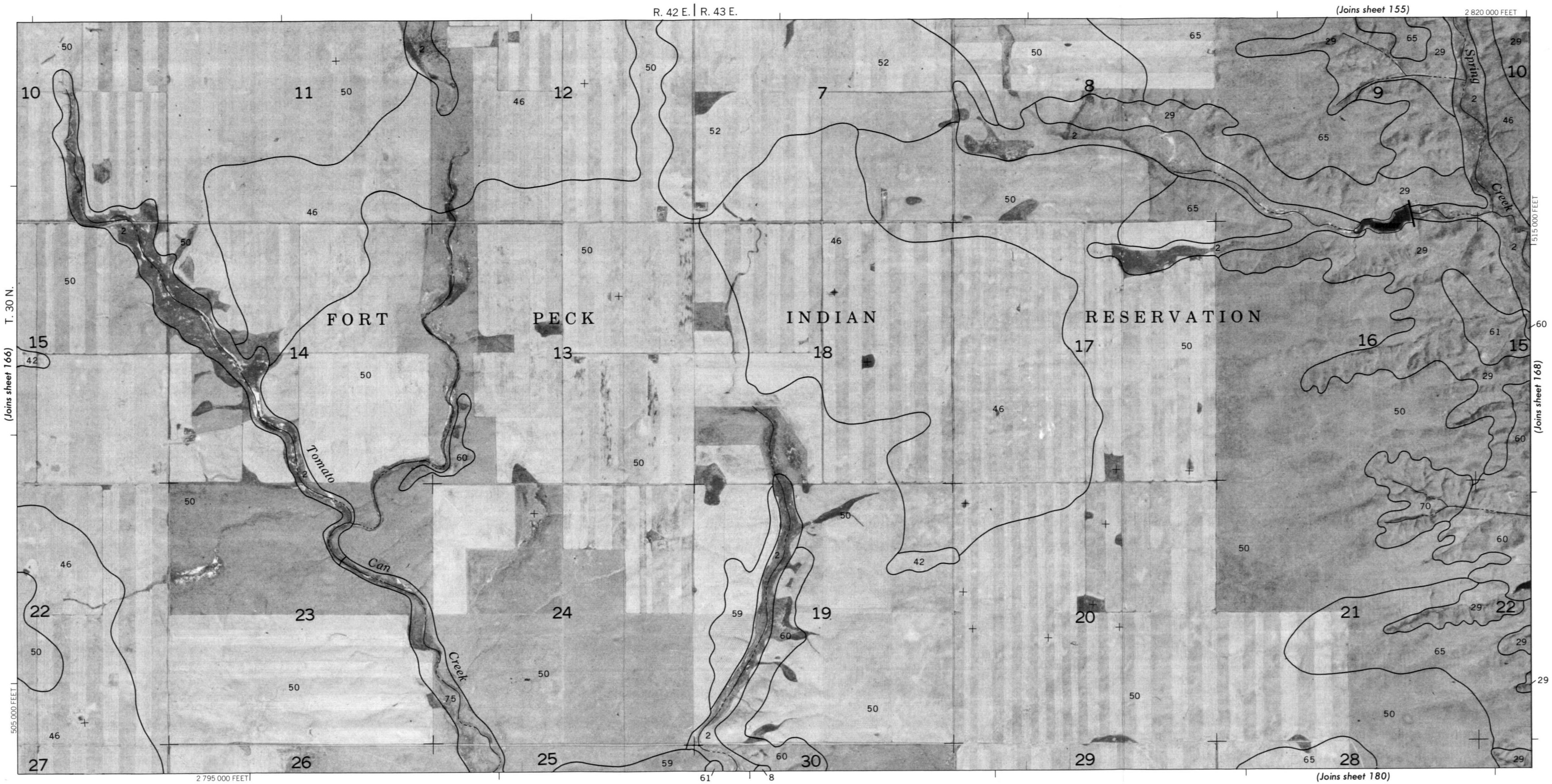
VALLEY COUNTY, MONTANA NO. 166

167

N

VALLEY COUNTY, MONTANA NO. 167

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



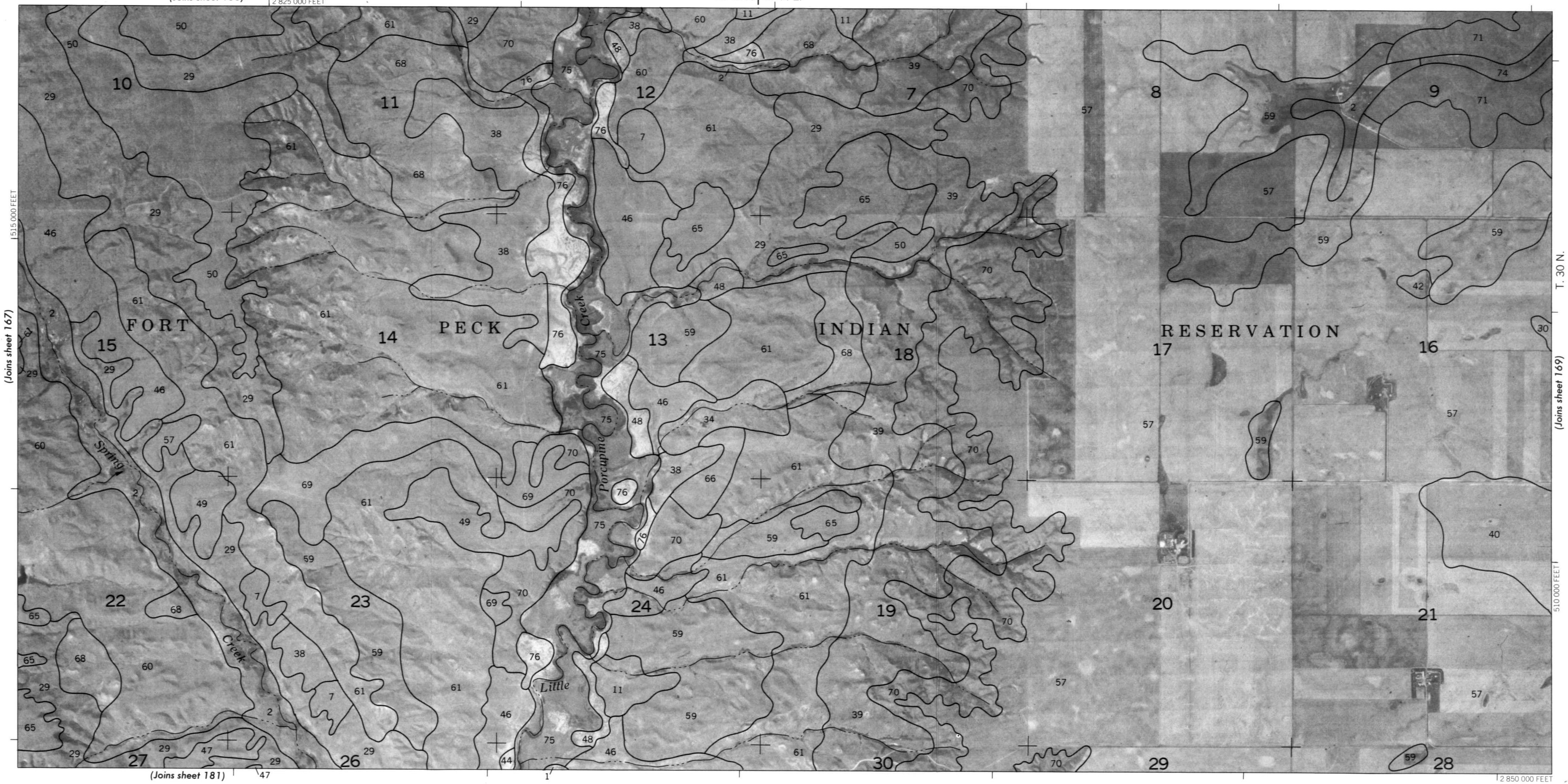
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 168



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

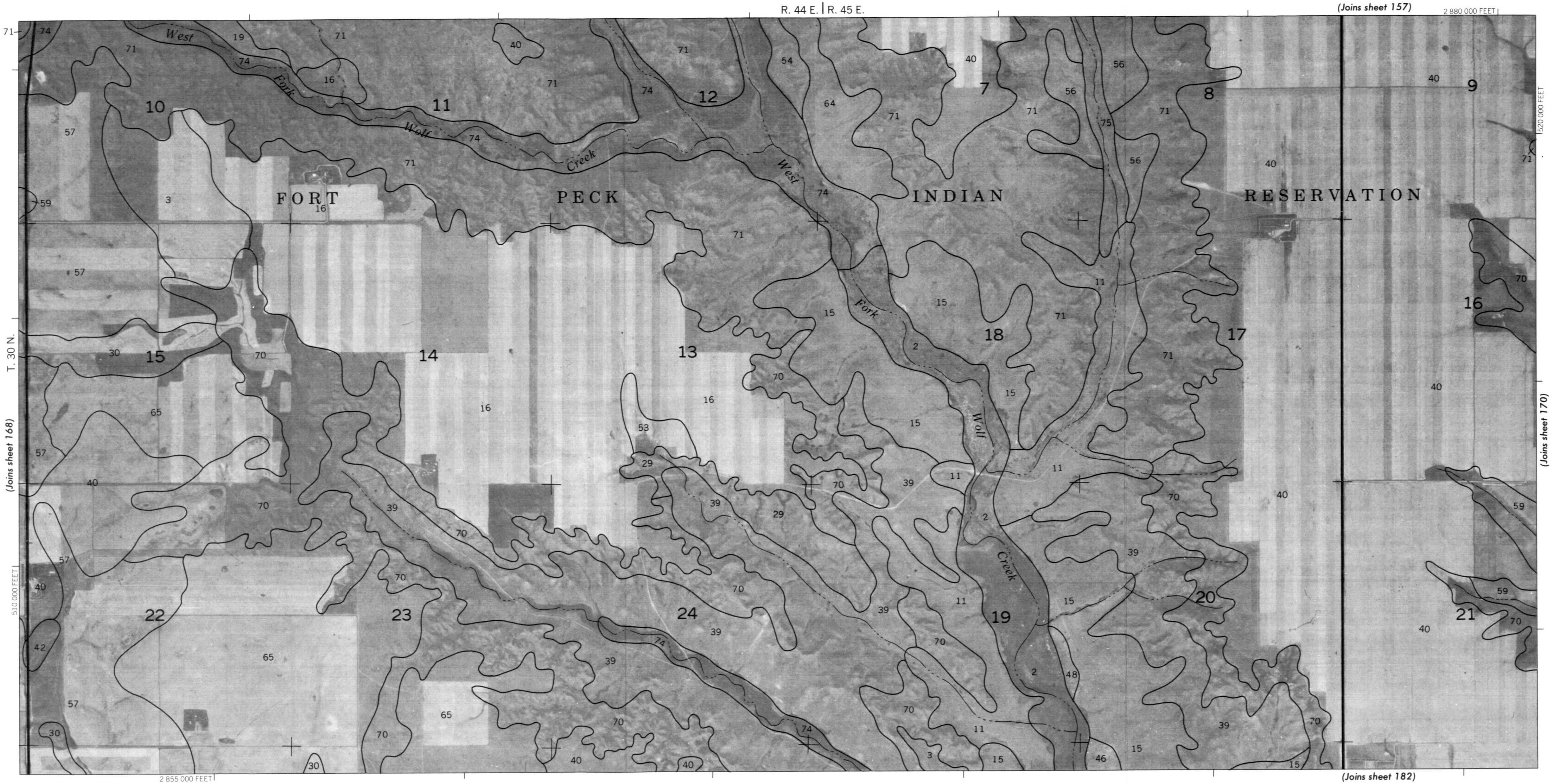
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA NO. 169

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



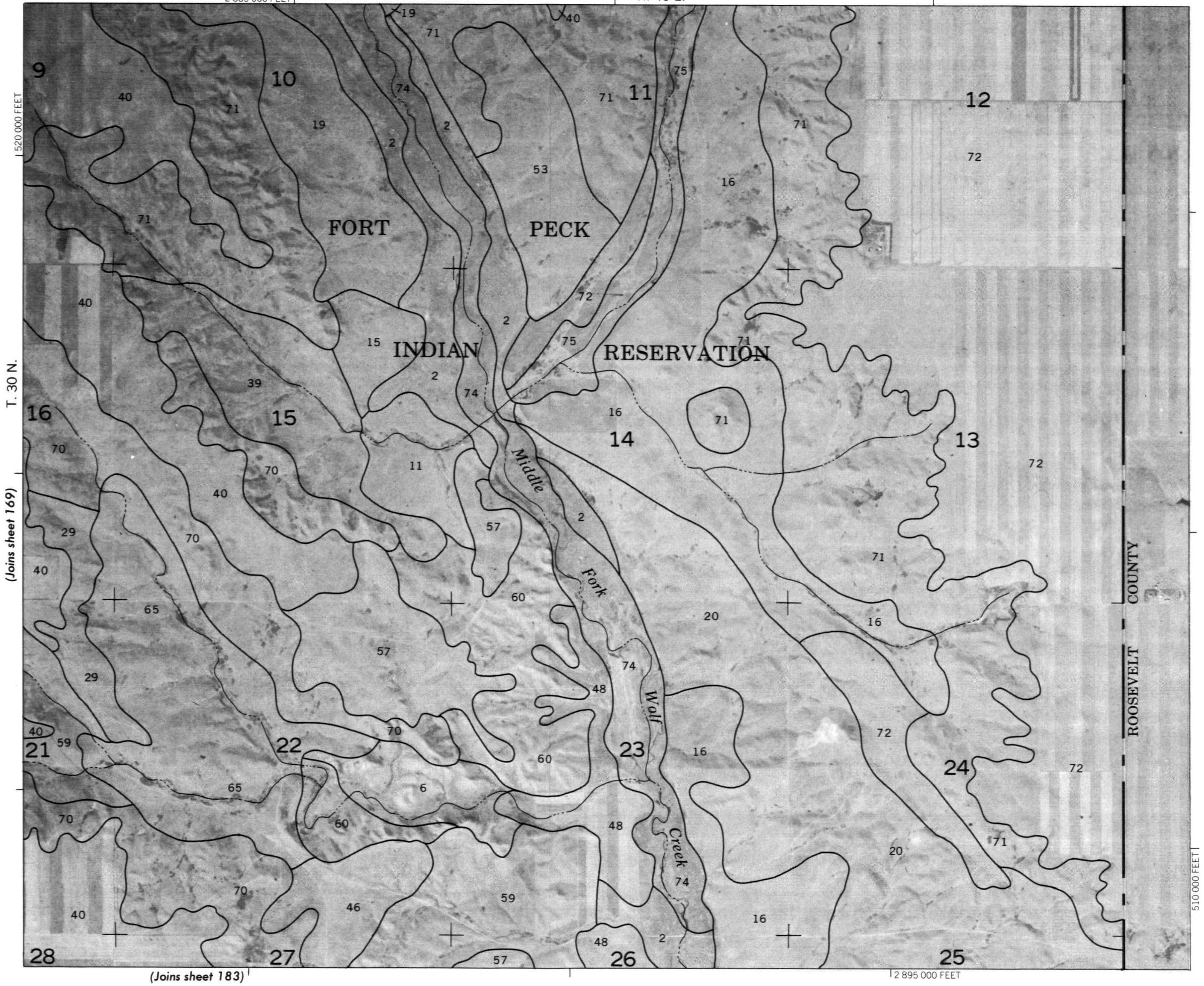
1 ¾ ½ ¼ 0 1 2 Miles

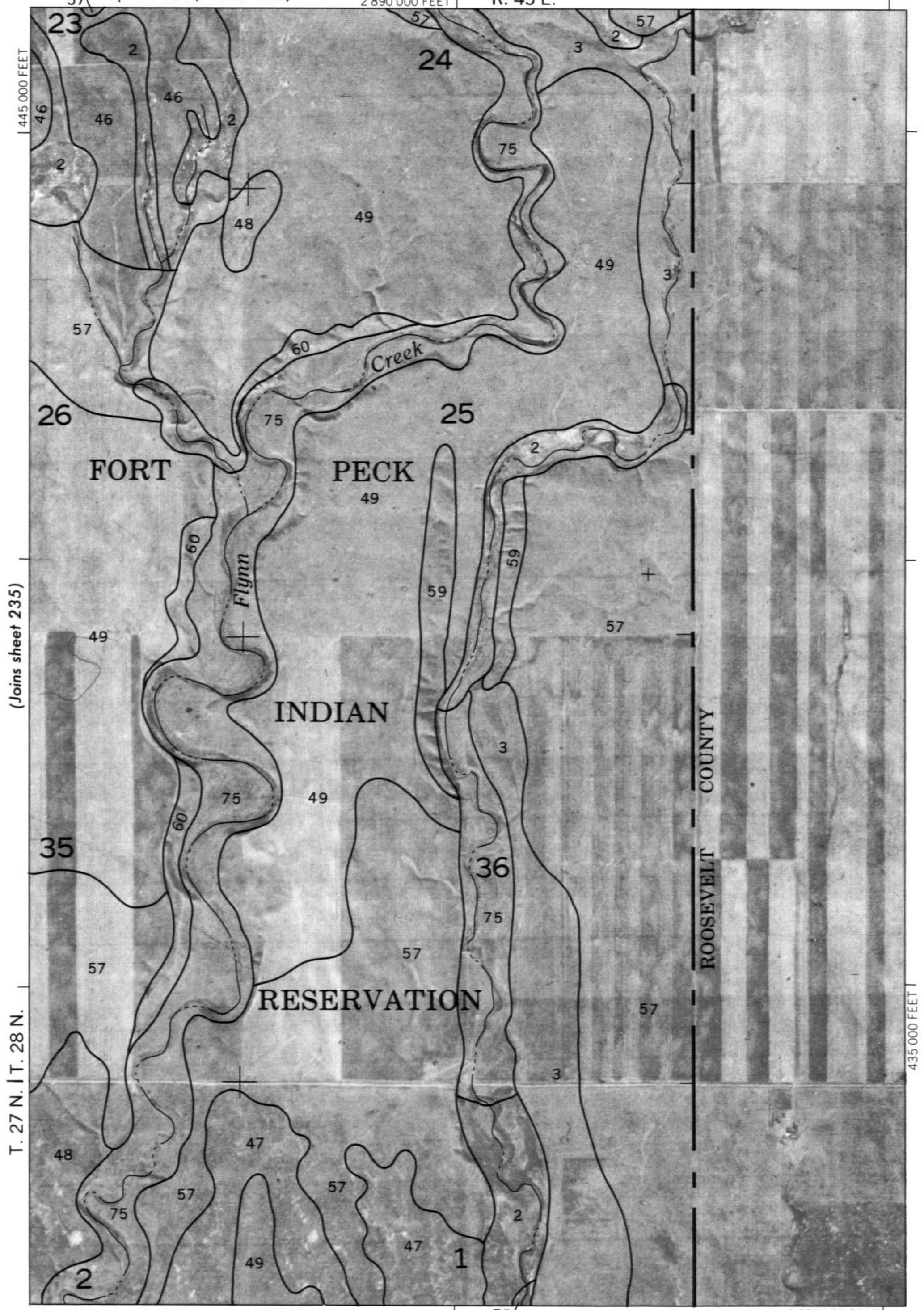
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 170





1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24 000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 170

171

N

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

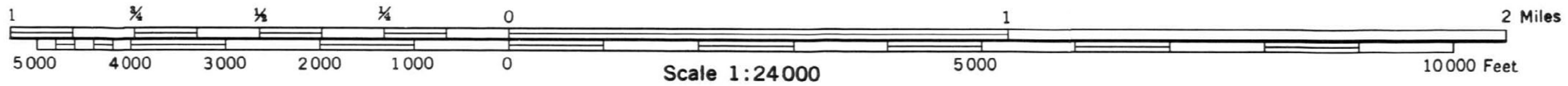
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

(172)

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 172



Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

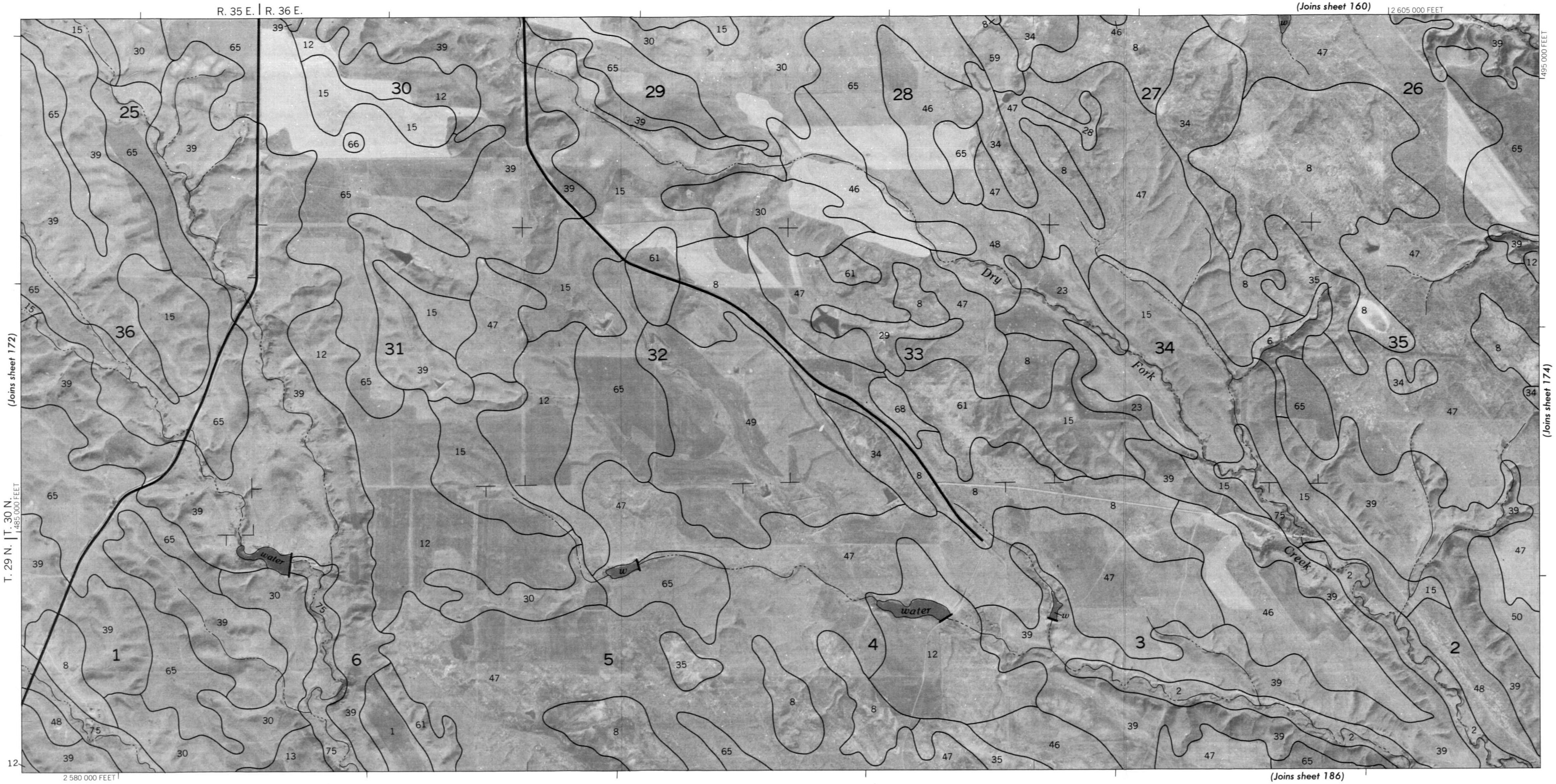
VALLEY COUNTY, MONTANA NO. 172

N

VALLEY COUNTY, MONTANA NO. 173

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5 000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



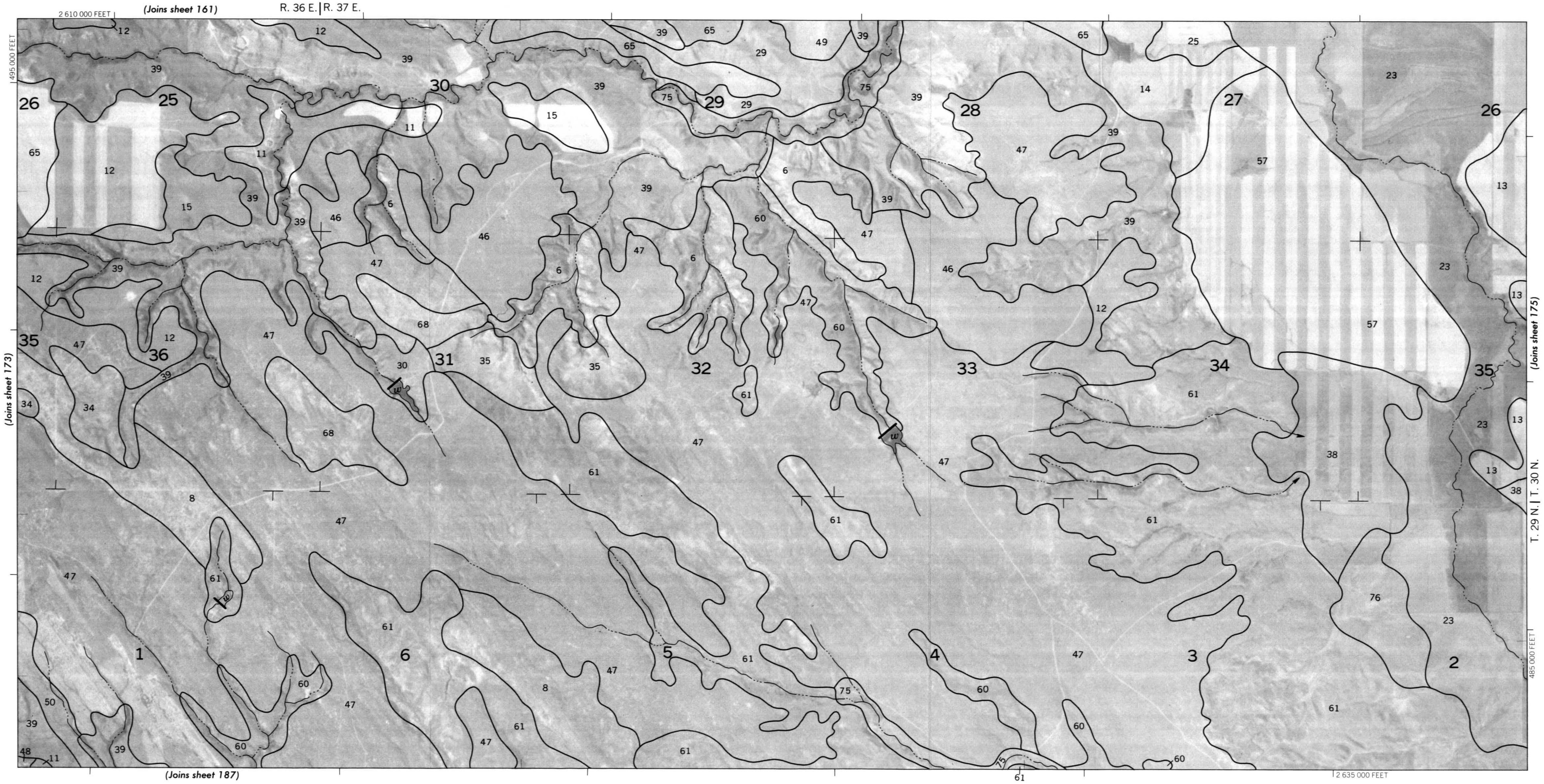
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

Scale 1:24 000

VALLEY COUNTY, MONTANA — SHEET NUMBER 174

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 174

175

N

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

Scale 1:24 000

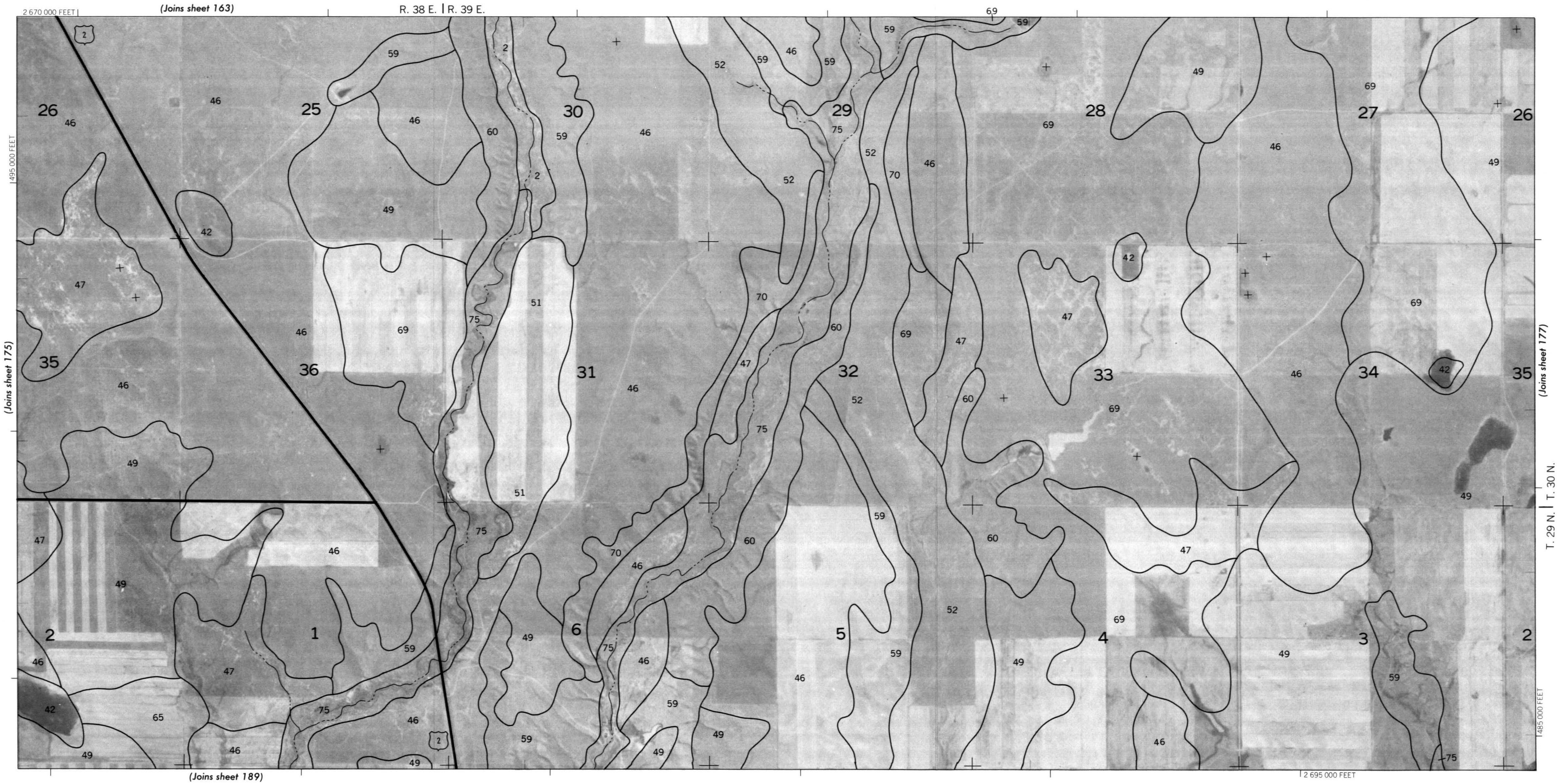
VALLEY COUNTY, MONTANA NO. 175

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5 000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

VALLEY COUNTY, MONTANA — SHEET NUMBER 176

N



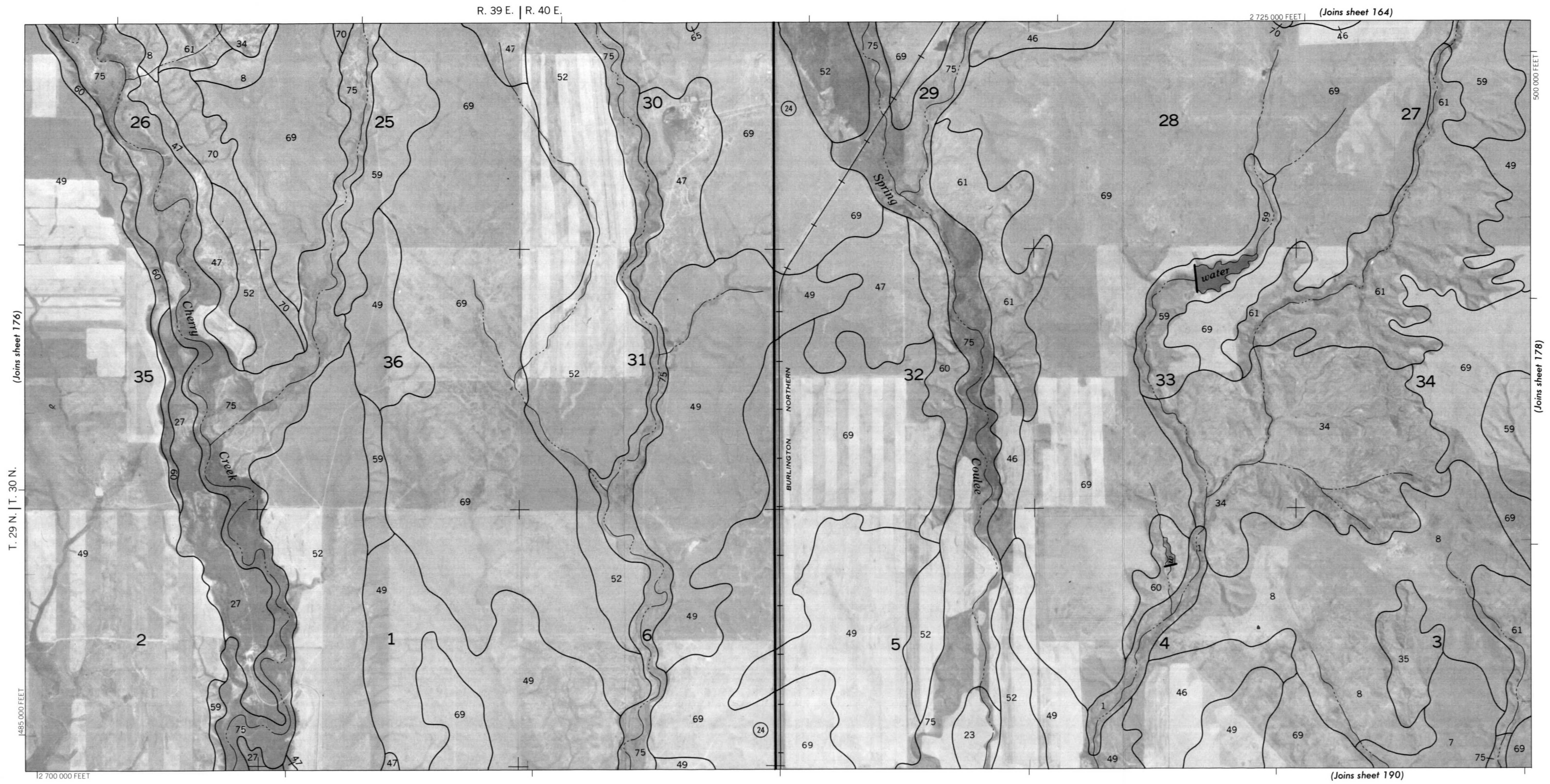
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.



Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

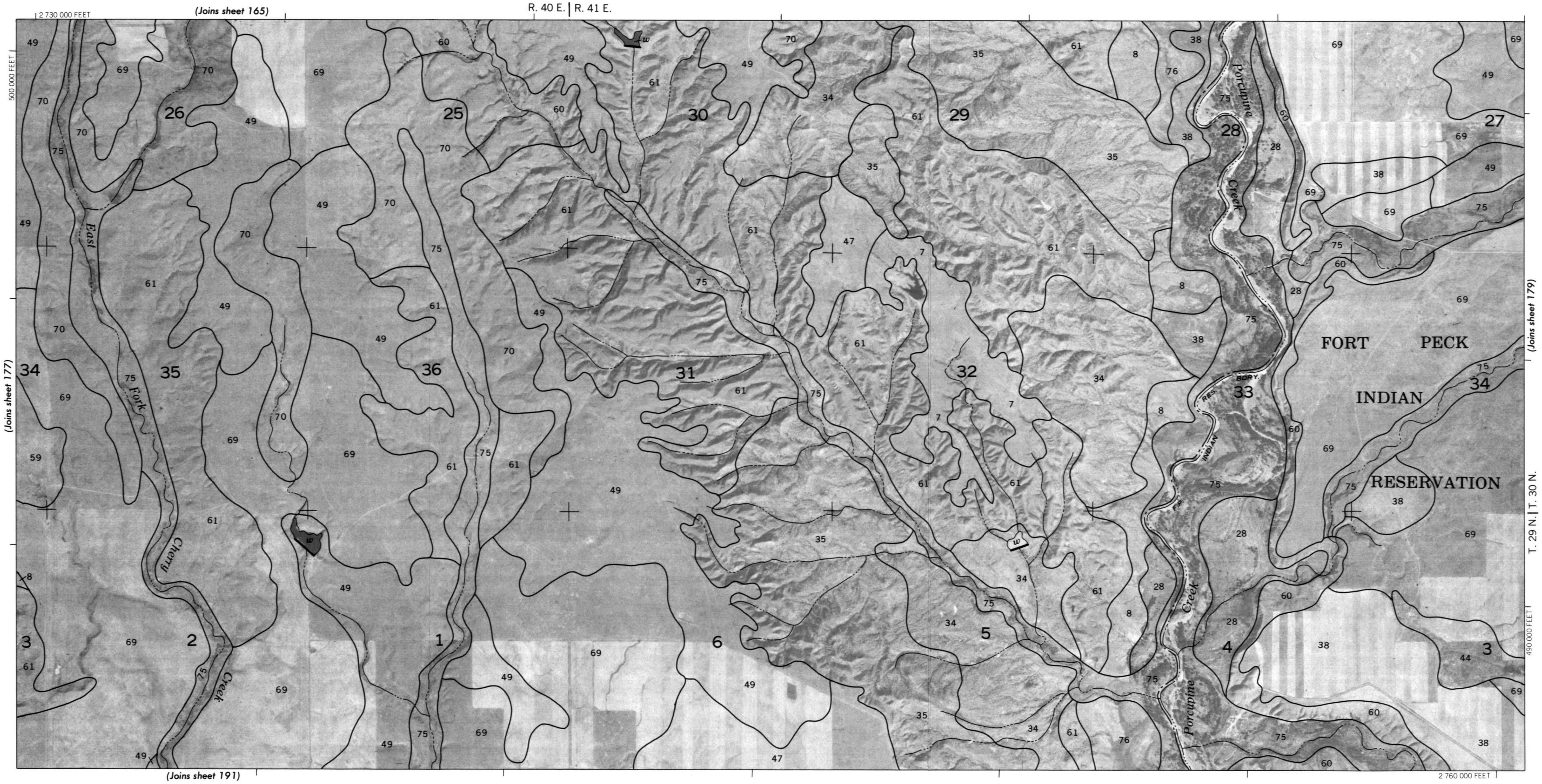
VALLEY COUNTY, MONTANA NO. 177

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

178

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 178



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

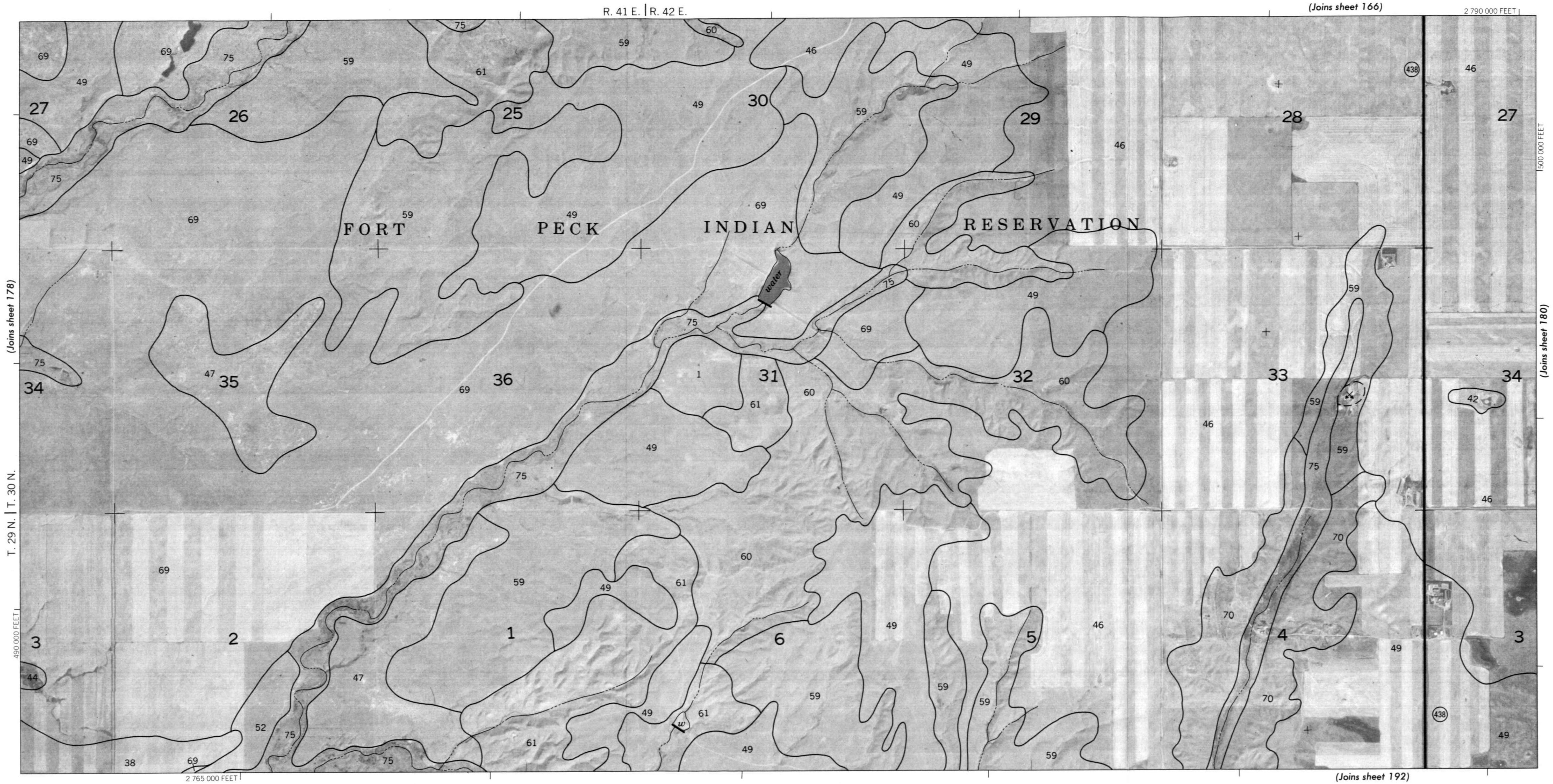
VALLEY COUNTY, MONTANA NO. 178

179

N

VALLEY COUNTY, MONTANA NO. 179

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



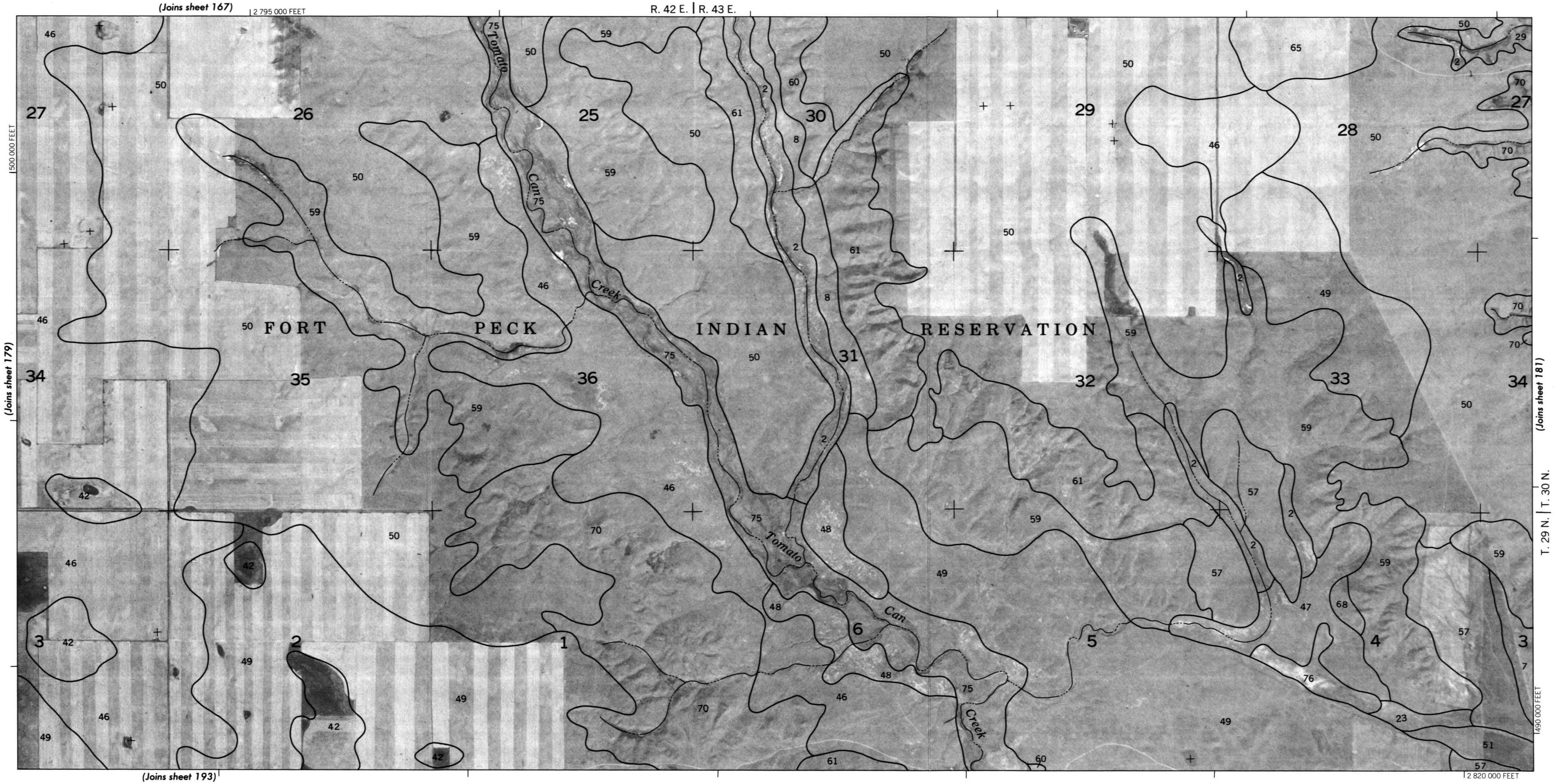
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 180

N



1 ¾ ½ ¼ 0 1 2 Miles

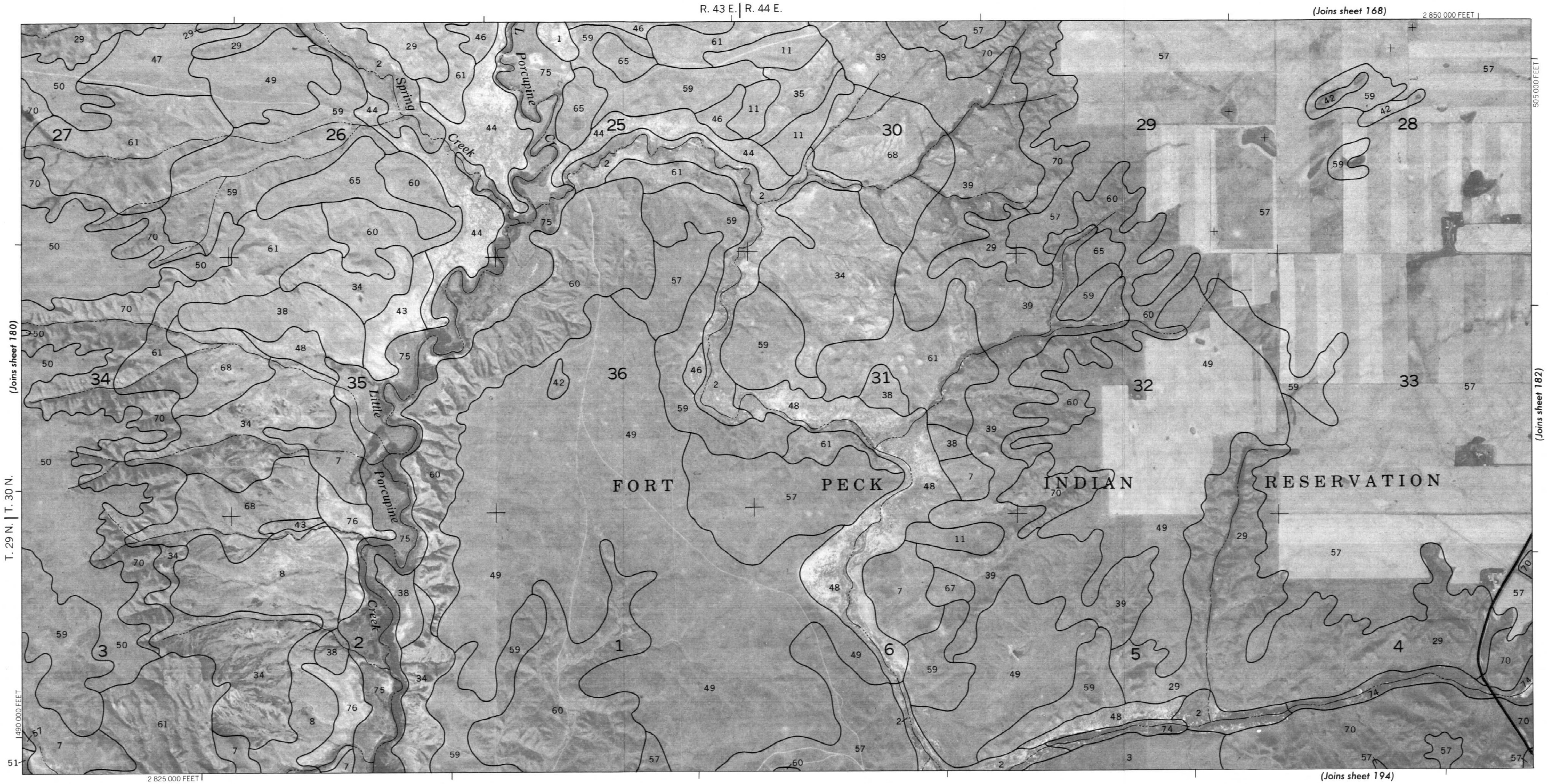
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA — SHEET NUMBER 181



N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

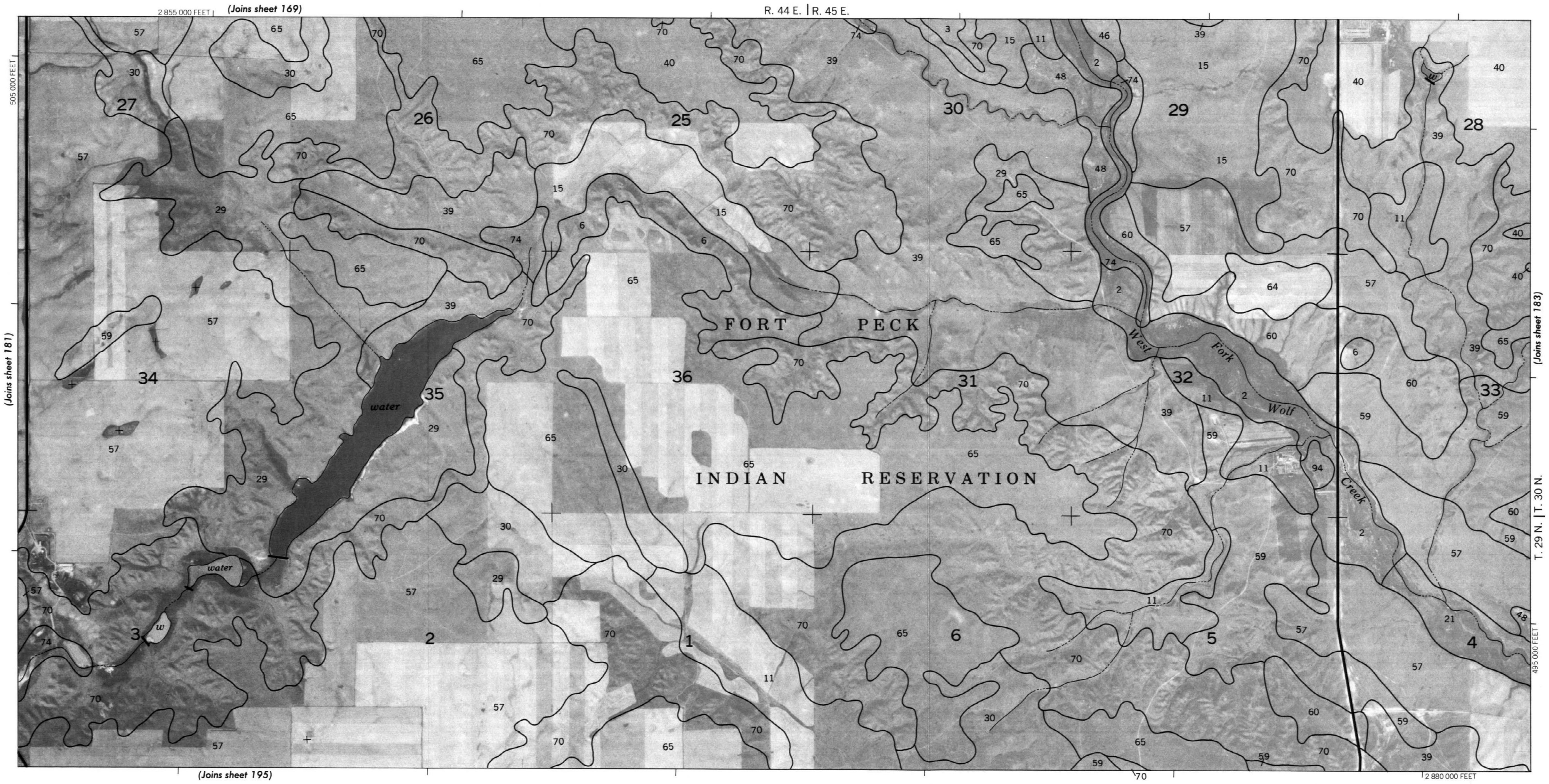
VALLEY COUNTY, MONTANA NO. 181

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

182

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 182



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

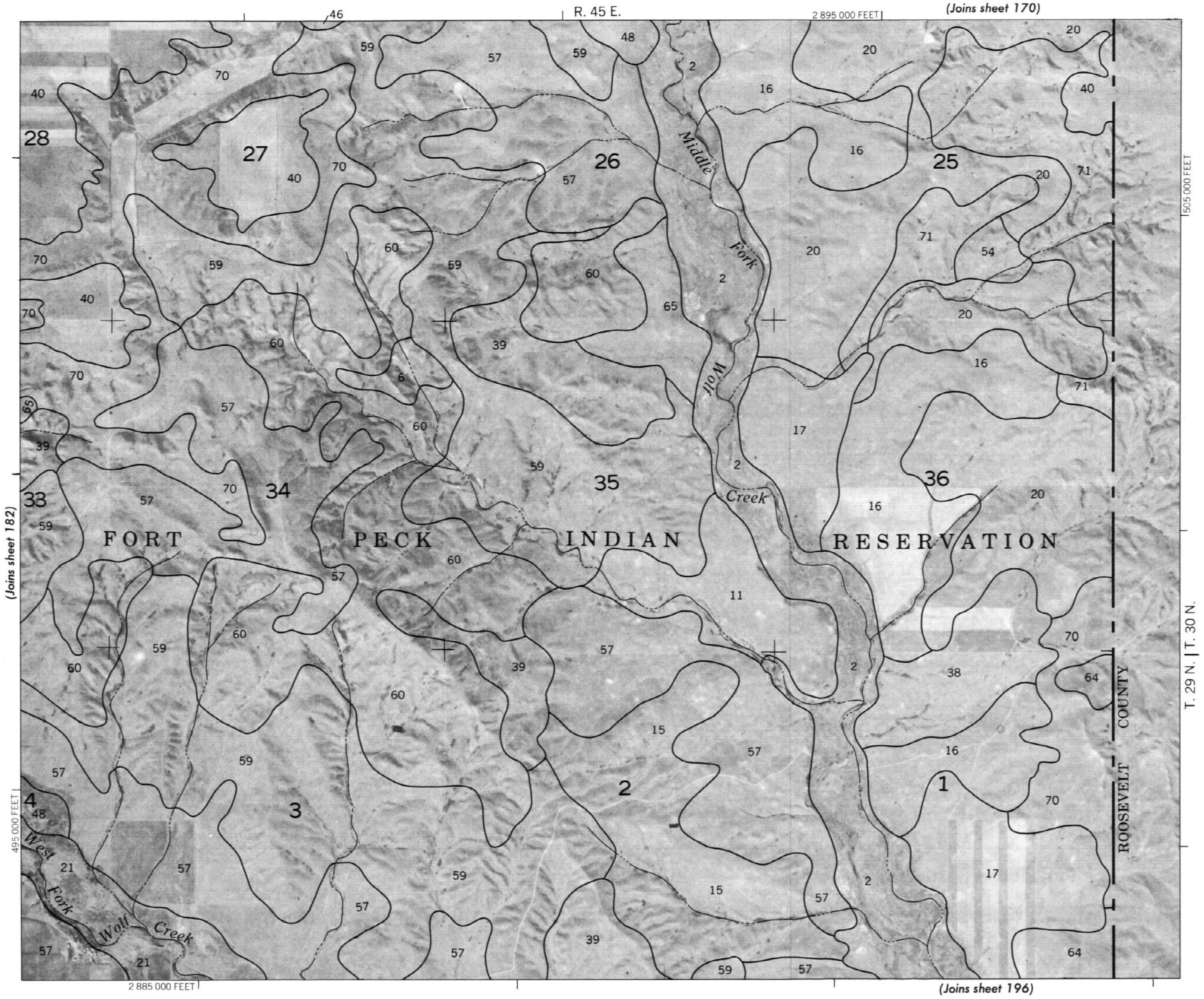
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

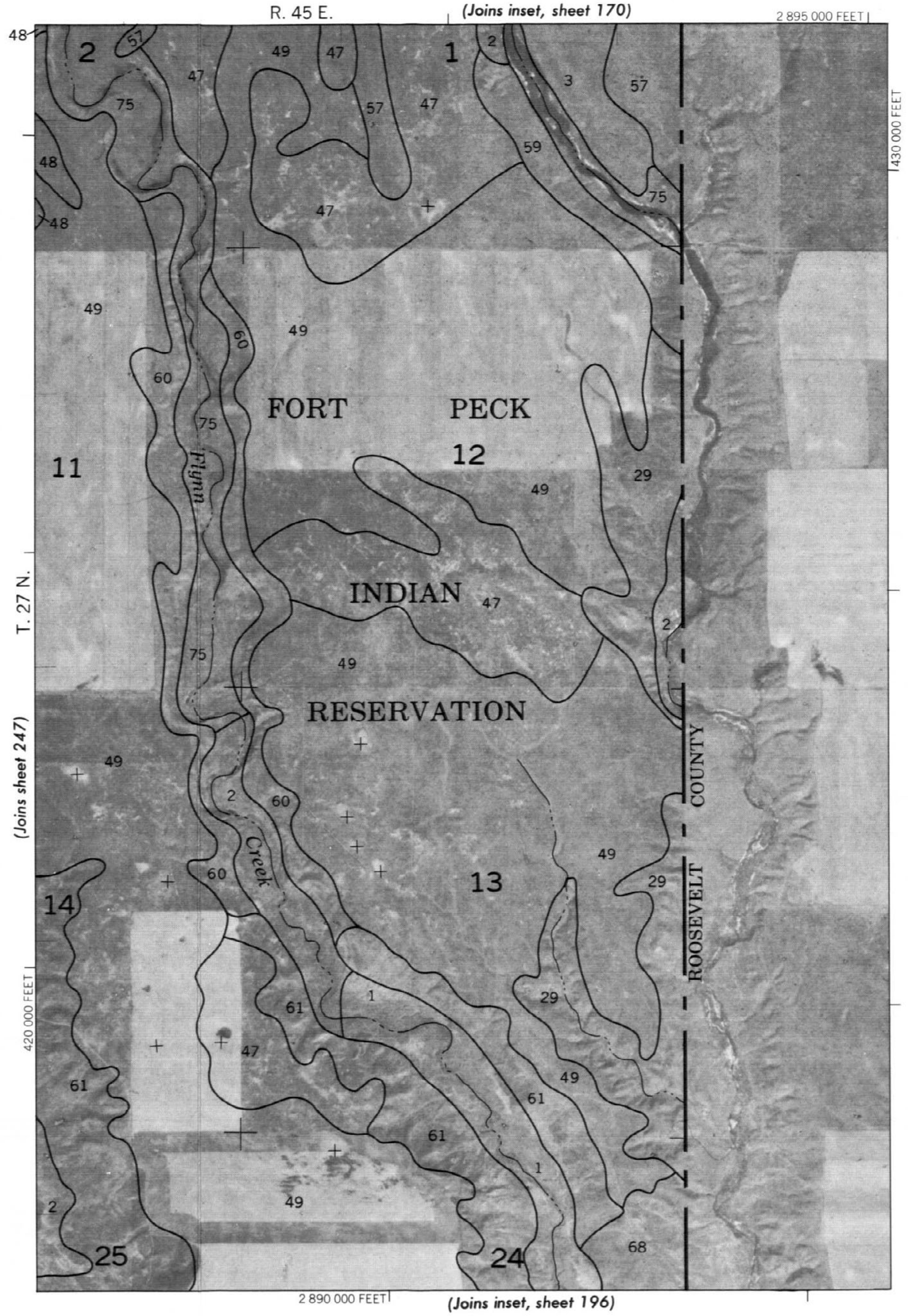
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 182

(183)

N





1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

184

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 184

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

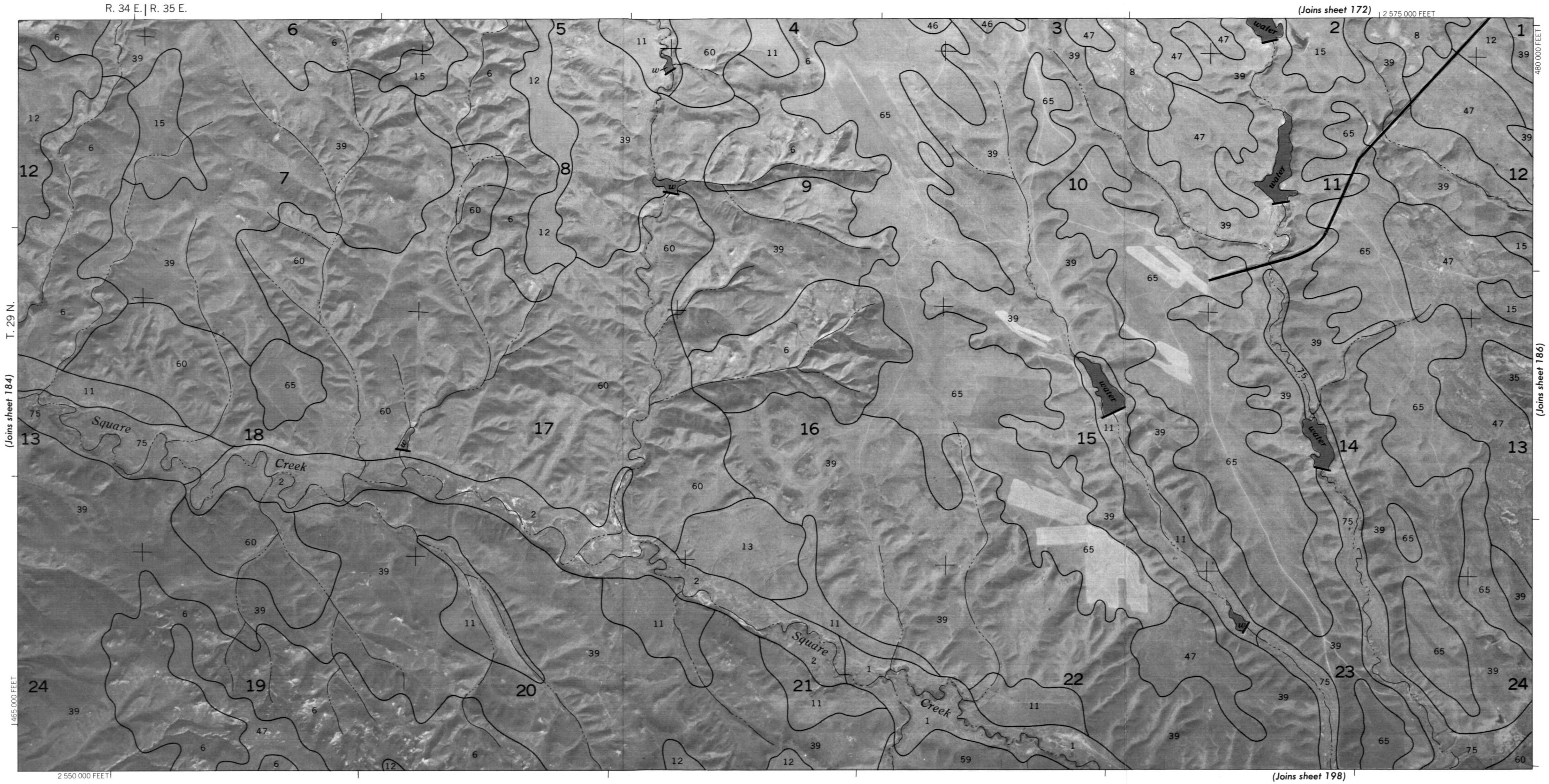
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 184

185

N



1 ¾ ½ ¼ 0 1 2 Miles

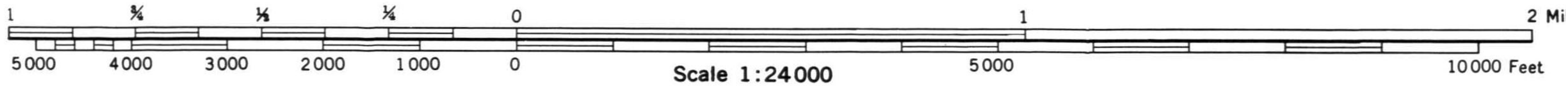
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 185

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

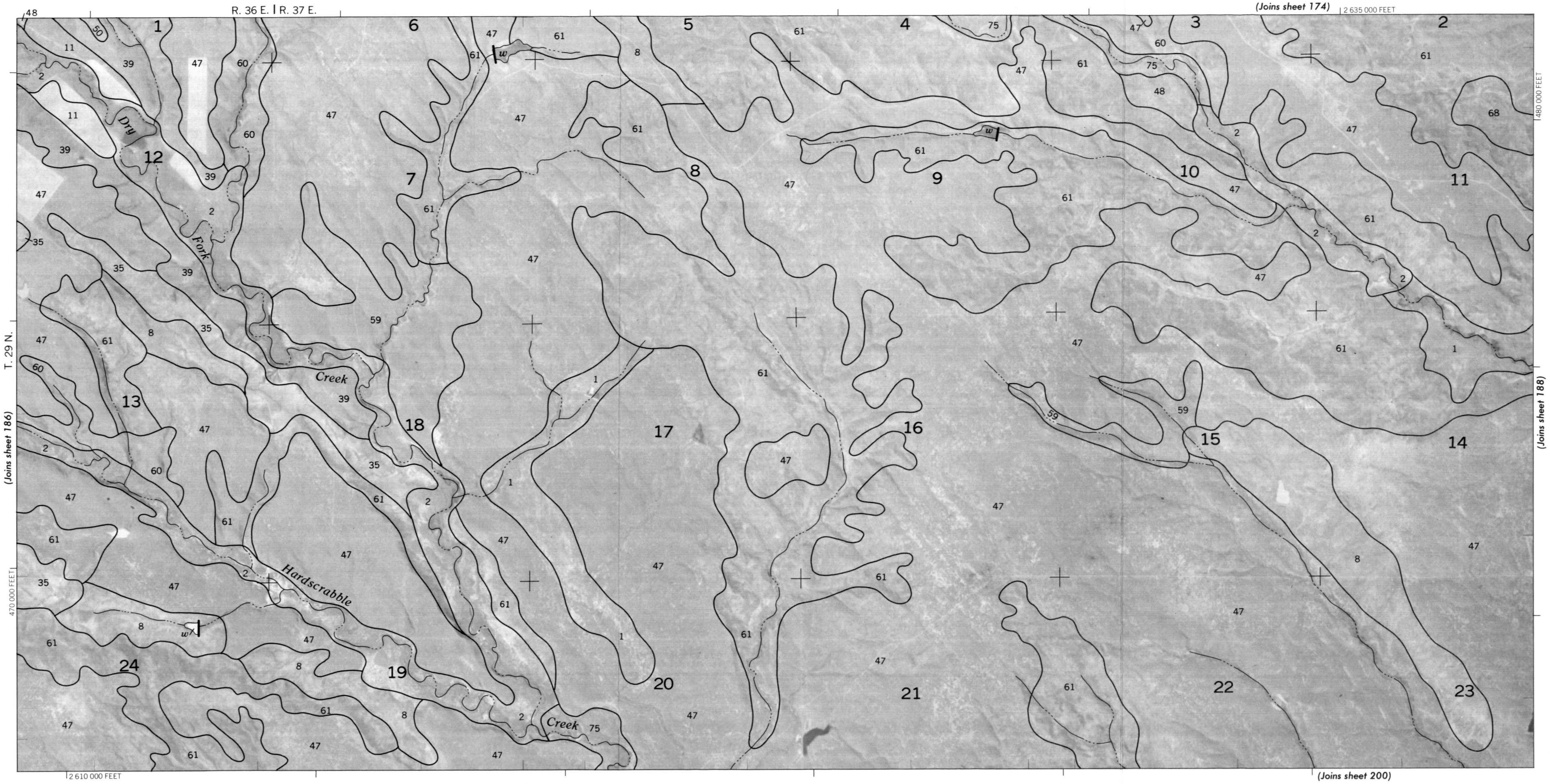
VALLEY COUNTY, MONTANA — SHEET NUMBER 186



5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 187

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 188

1 ⅞ ½ ¼ 0 1 2 Miles

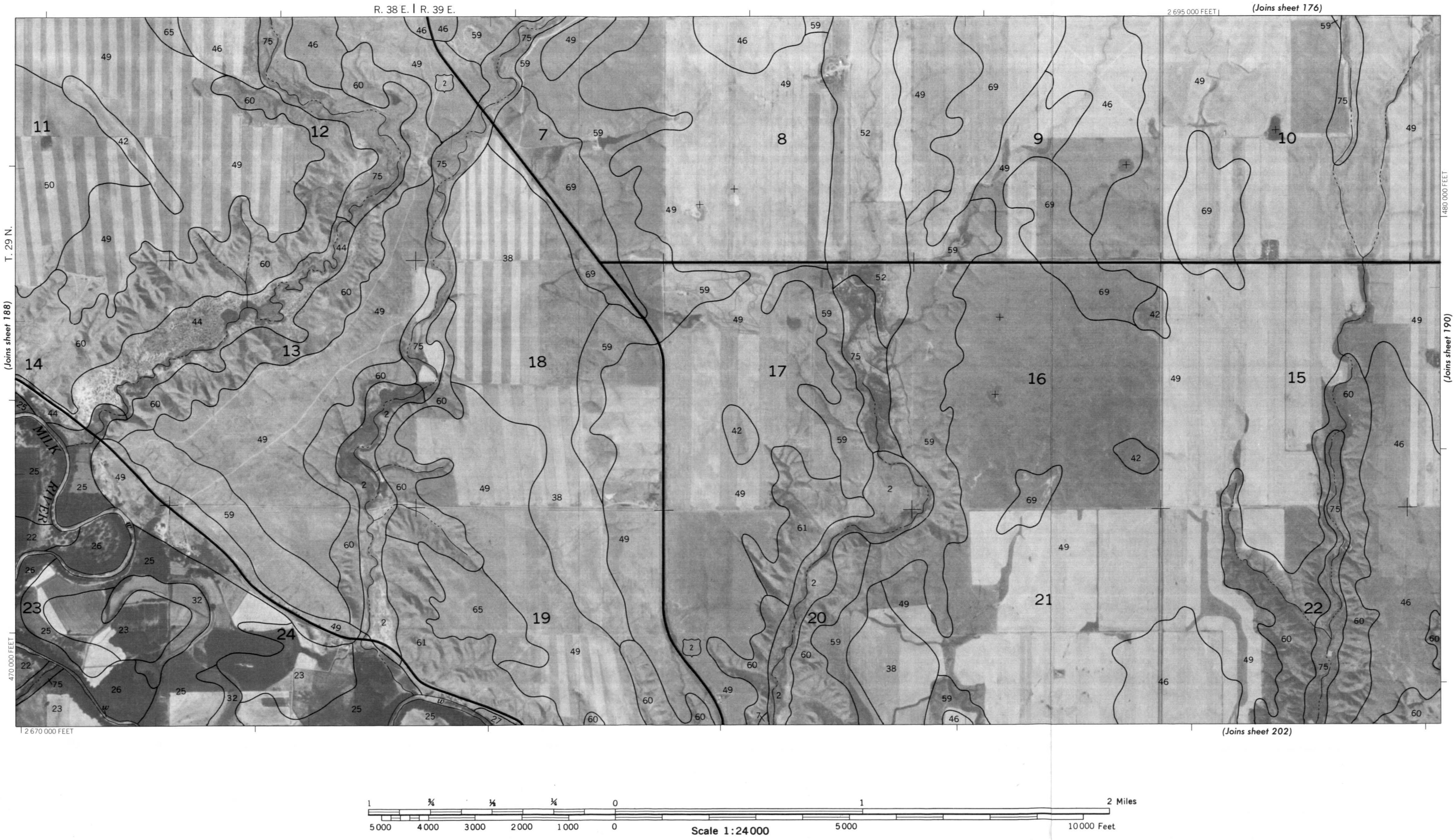
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

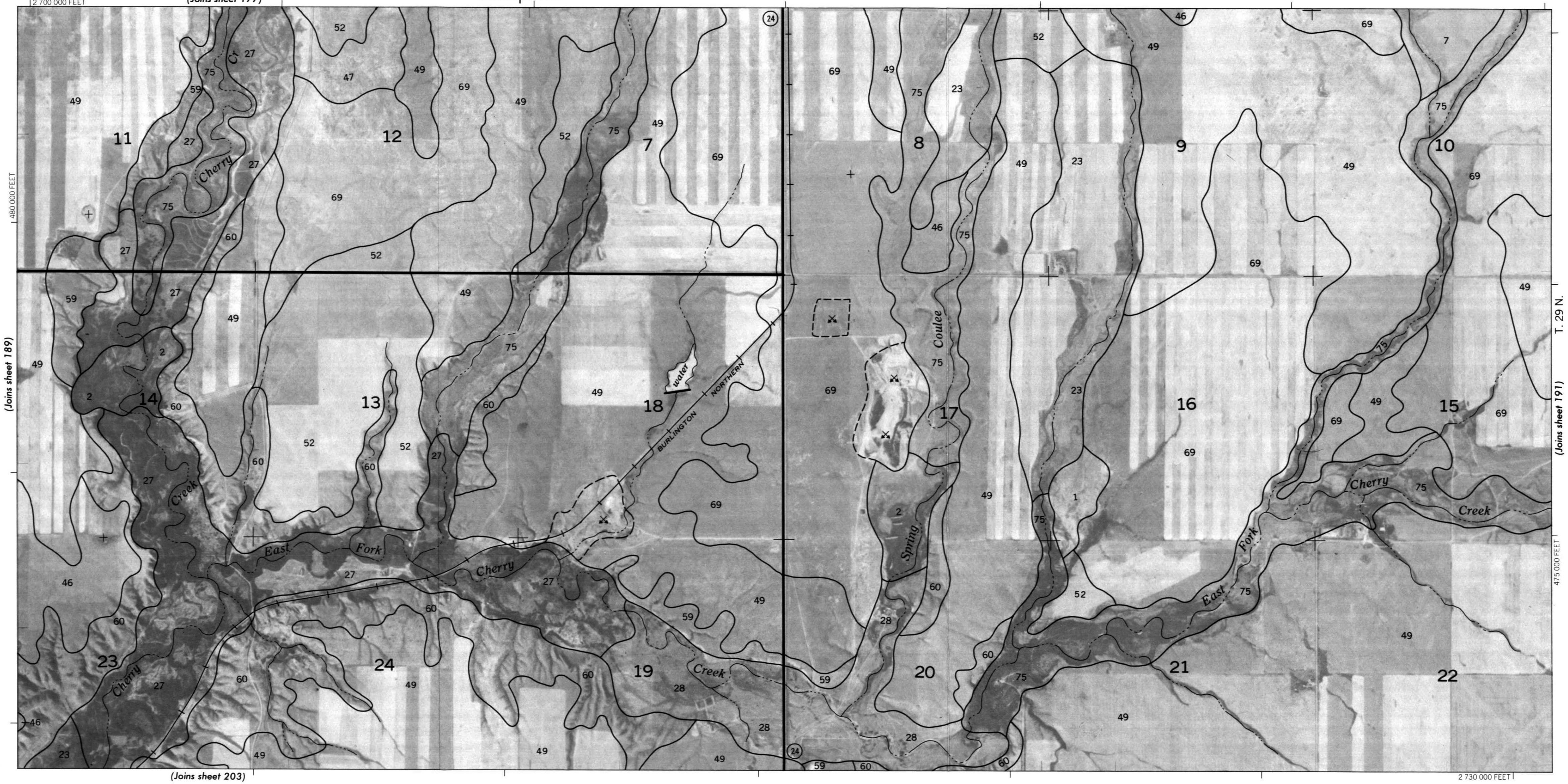


VALLEY COUNTY, MONTANA NO. 189

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 190



1 ¾ ½ ¼ 0 1 2 Miles

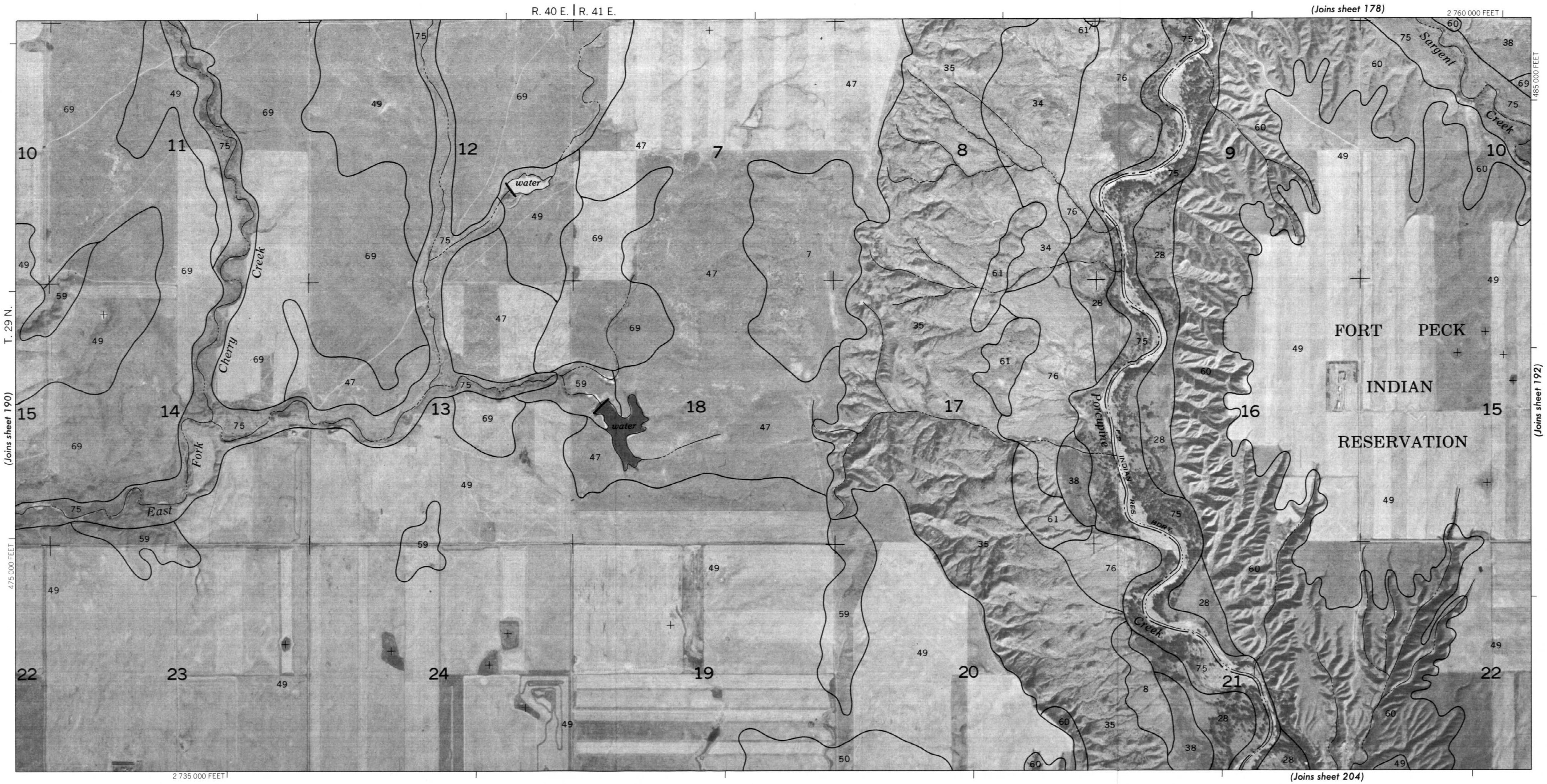
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



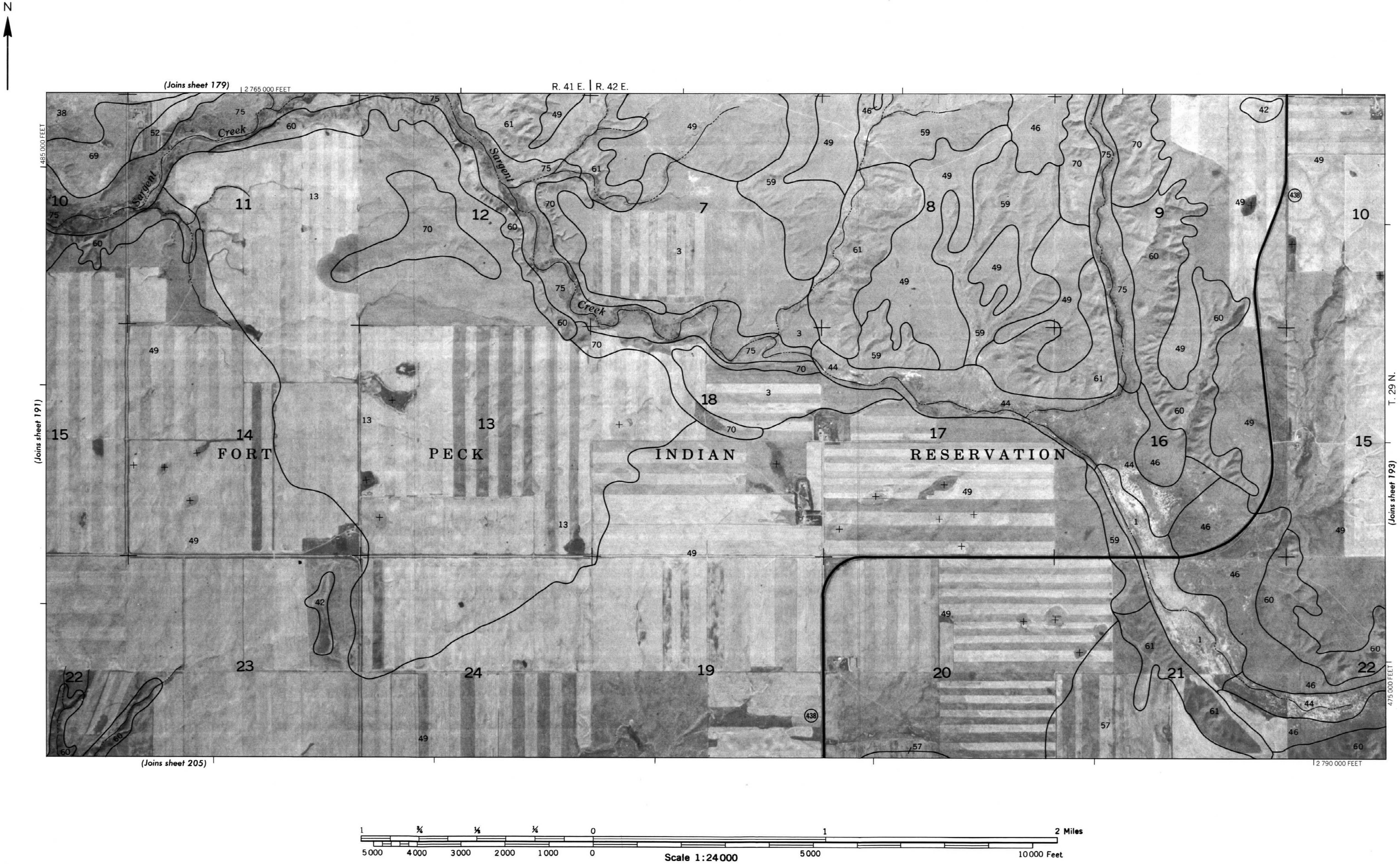
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

VALLEY COUNTY, MONTANA — SHEET NUMBER 192

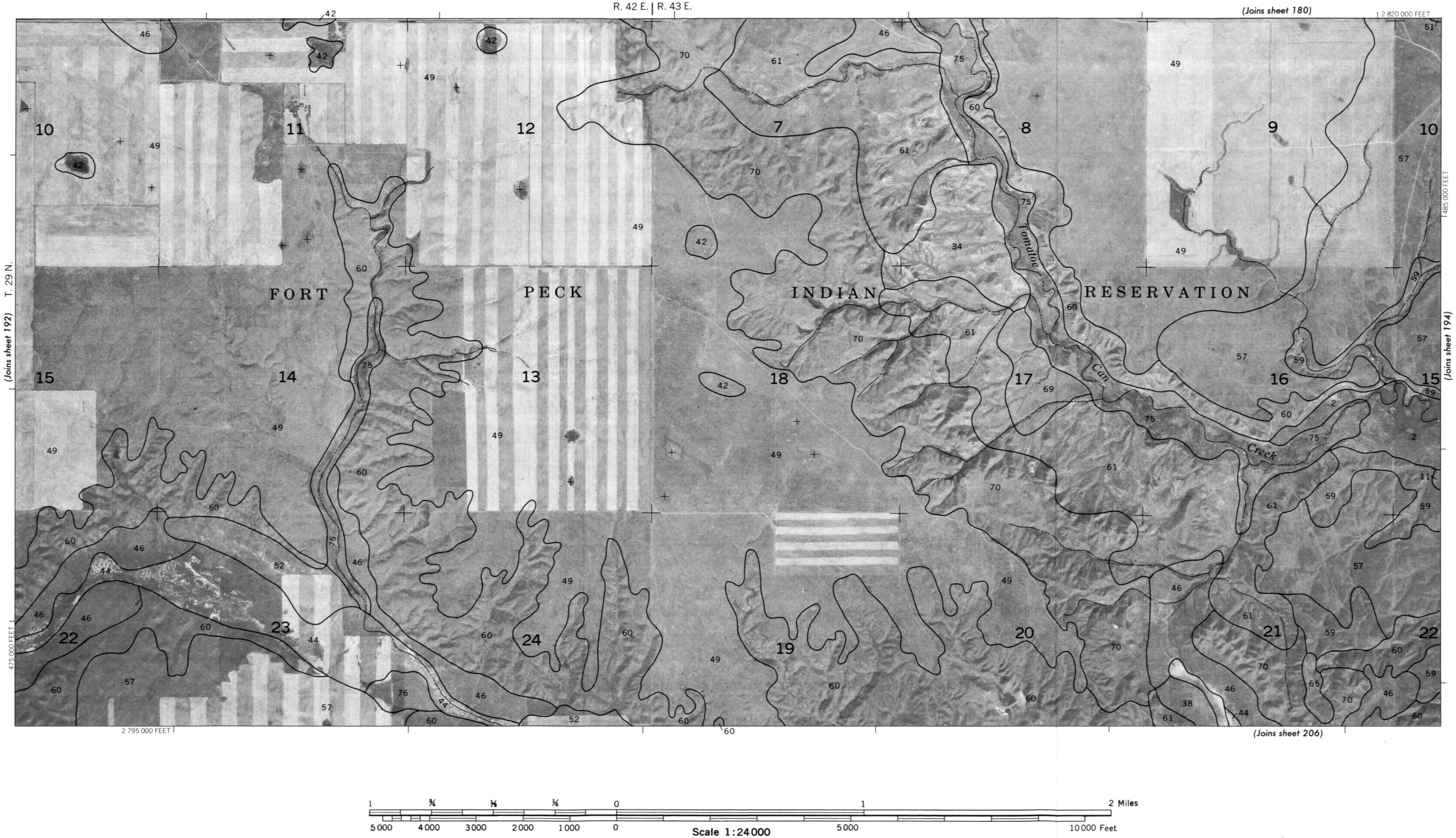


5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

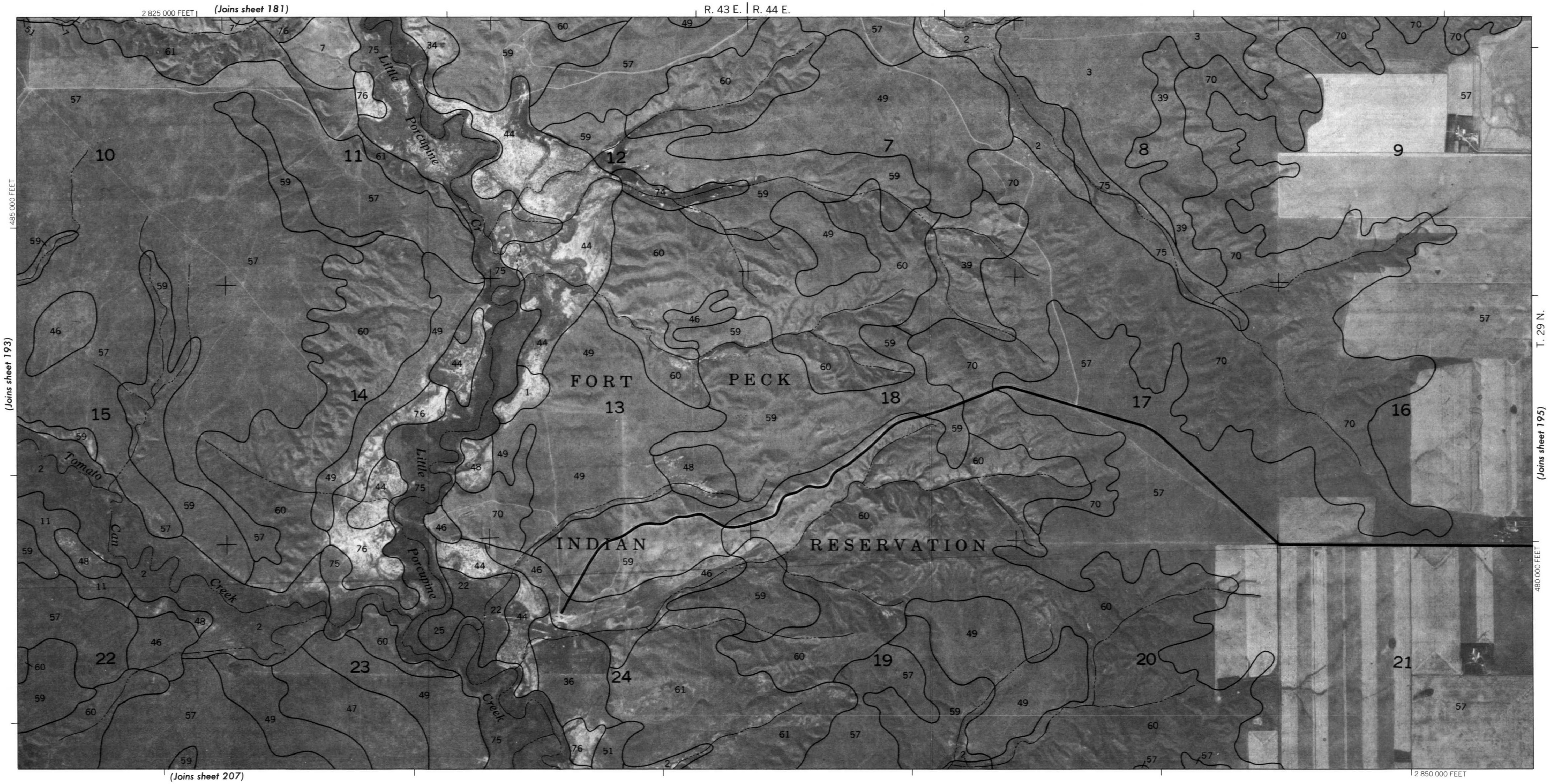
VALLEY COUNTY, MONTANA — SHEET NUMBER 193

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



VALLEY COUNTY, MONTANA — SHEET NUMBER 194

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

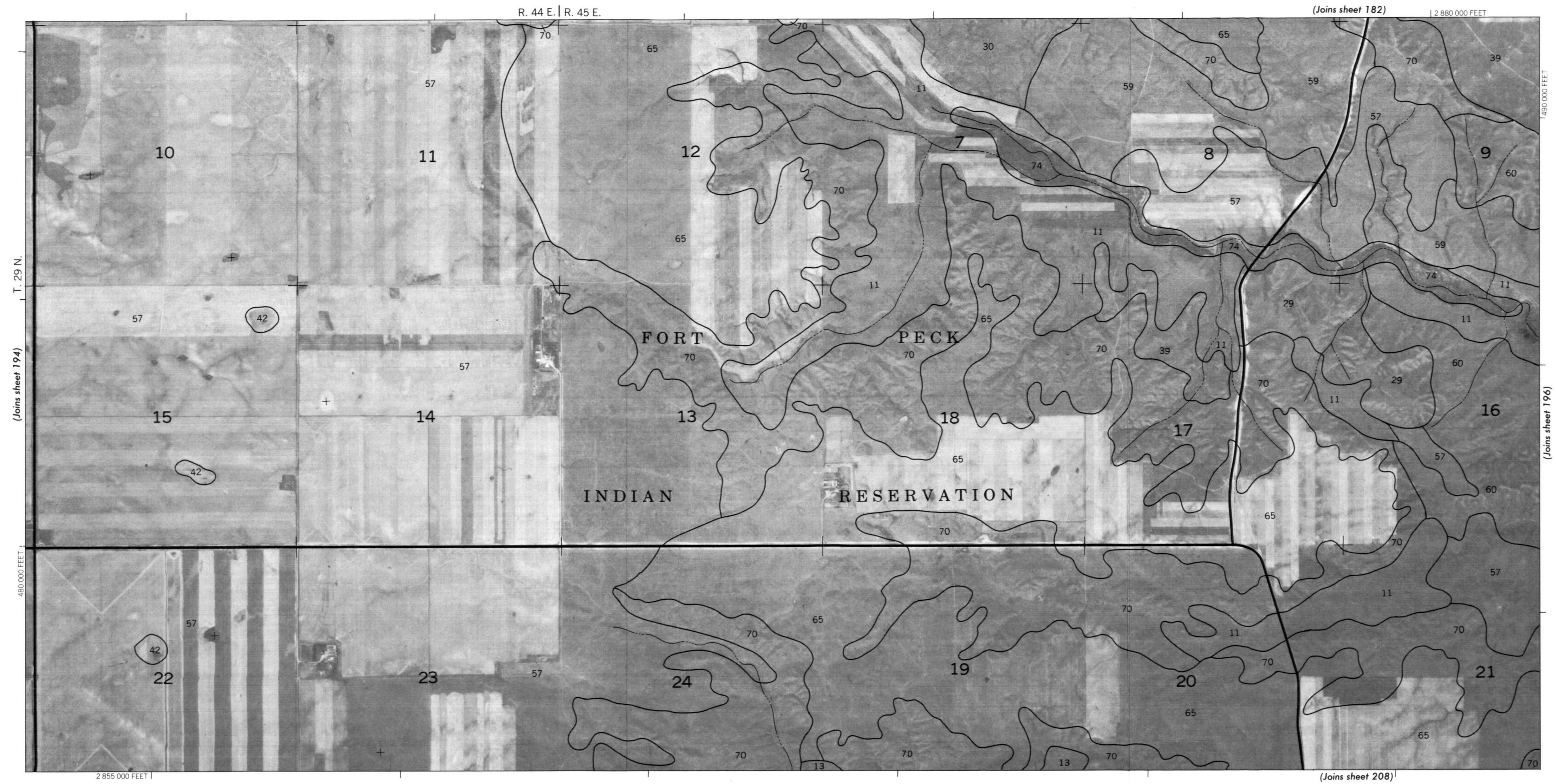
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA — SHEET NUMBER 195

N



Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

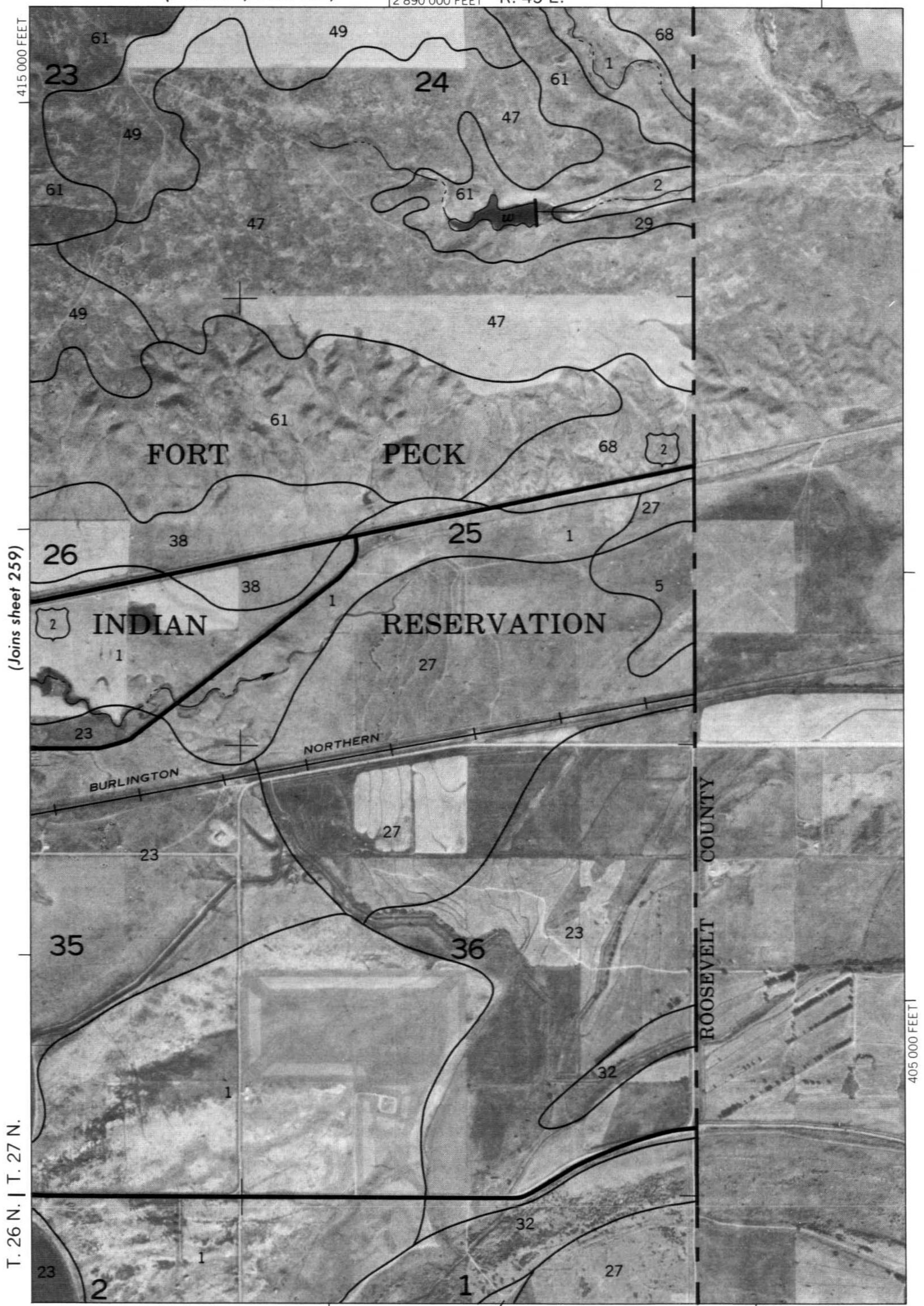
VALLEY COUNTY, MONTANA NO. 195

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 196



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

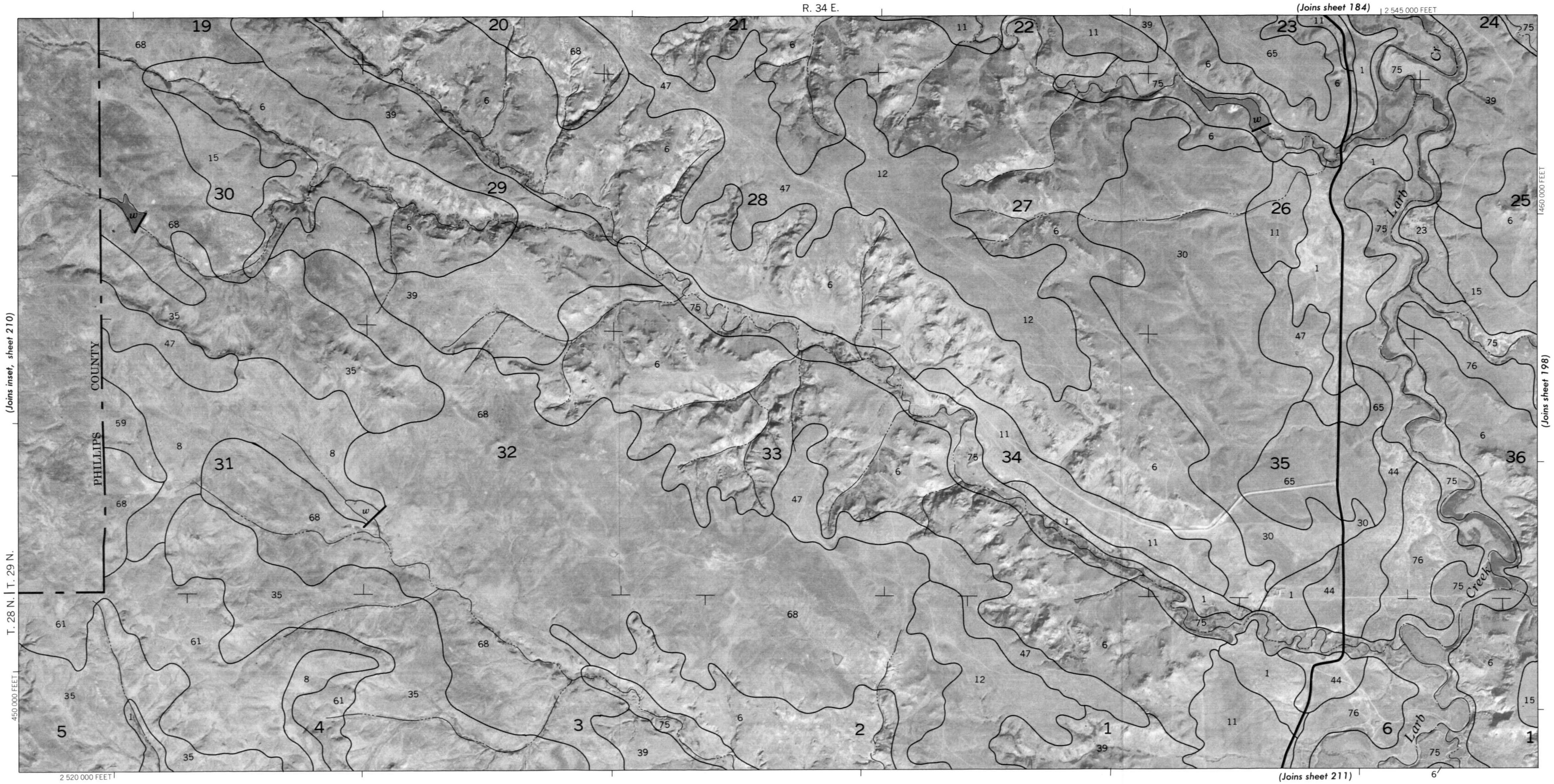
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 197

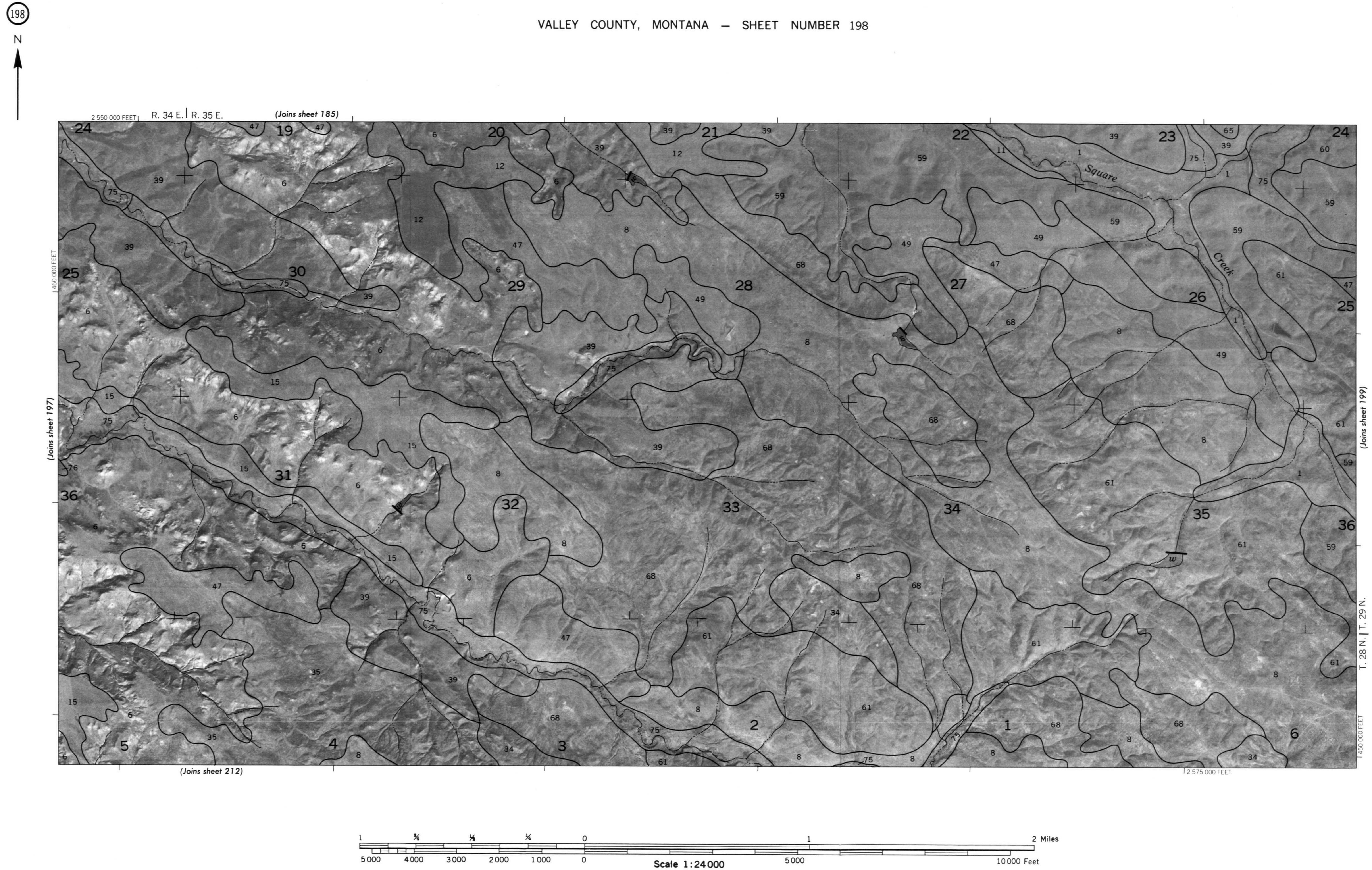
VALLEY COUNTY, MONTANA NO. 197

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 198



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

199

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

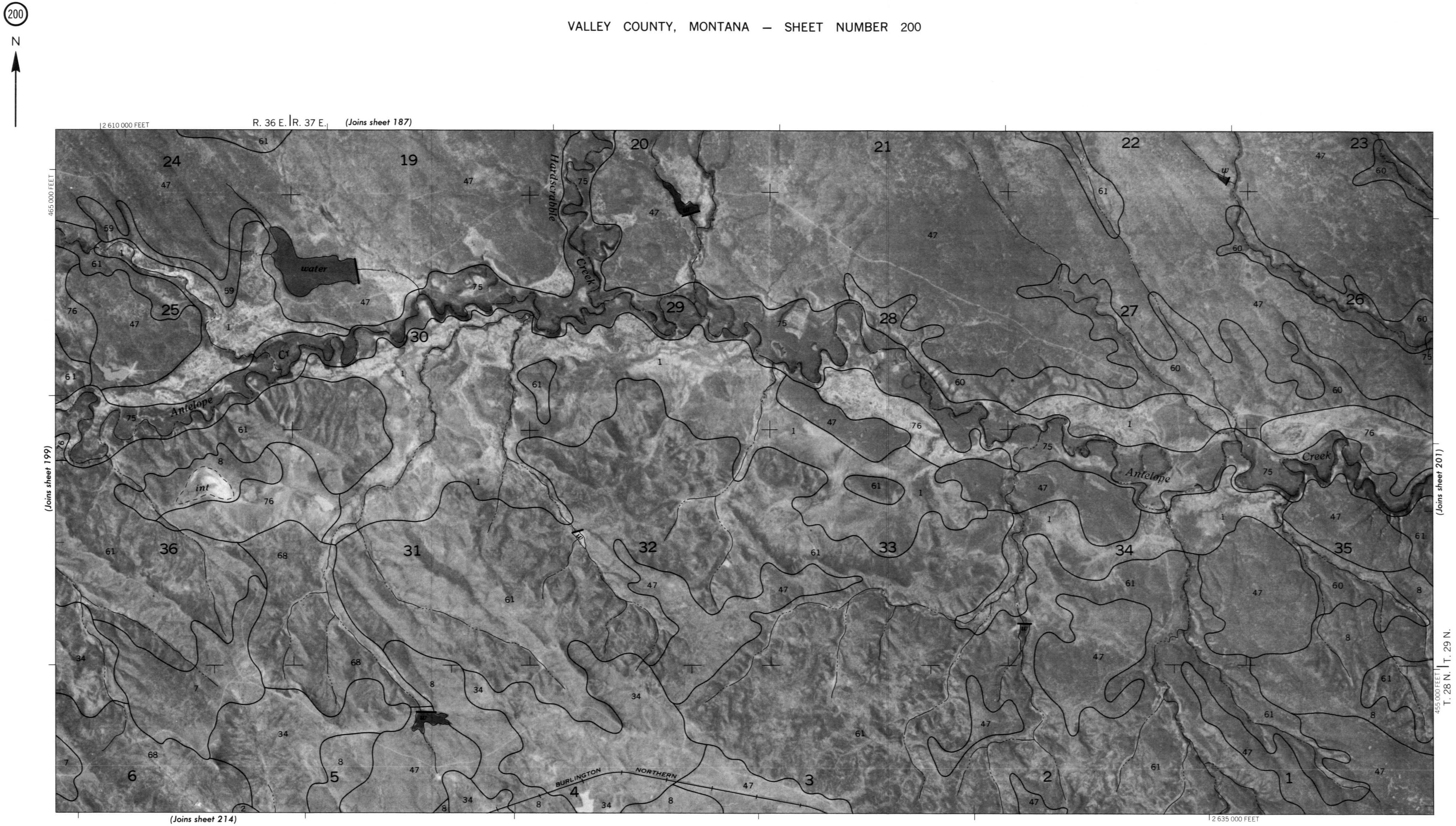
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 199

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 200



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

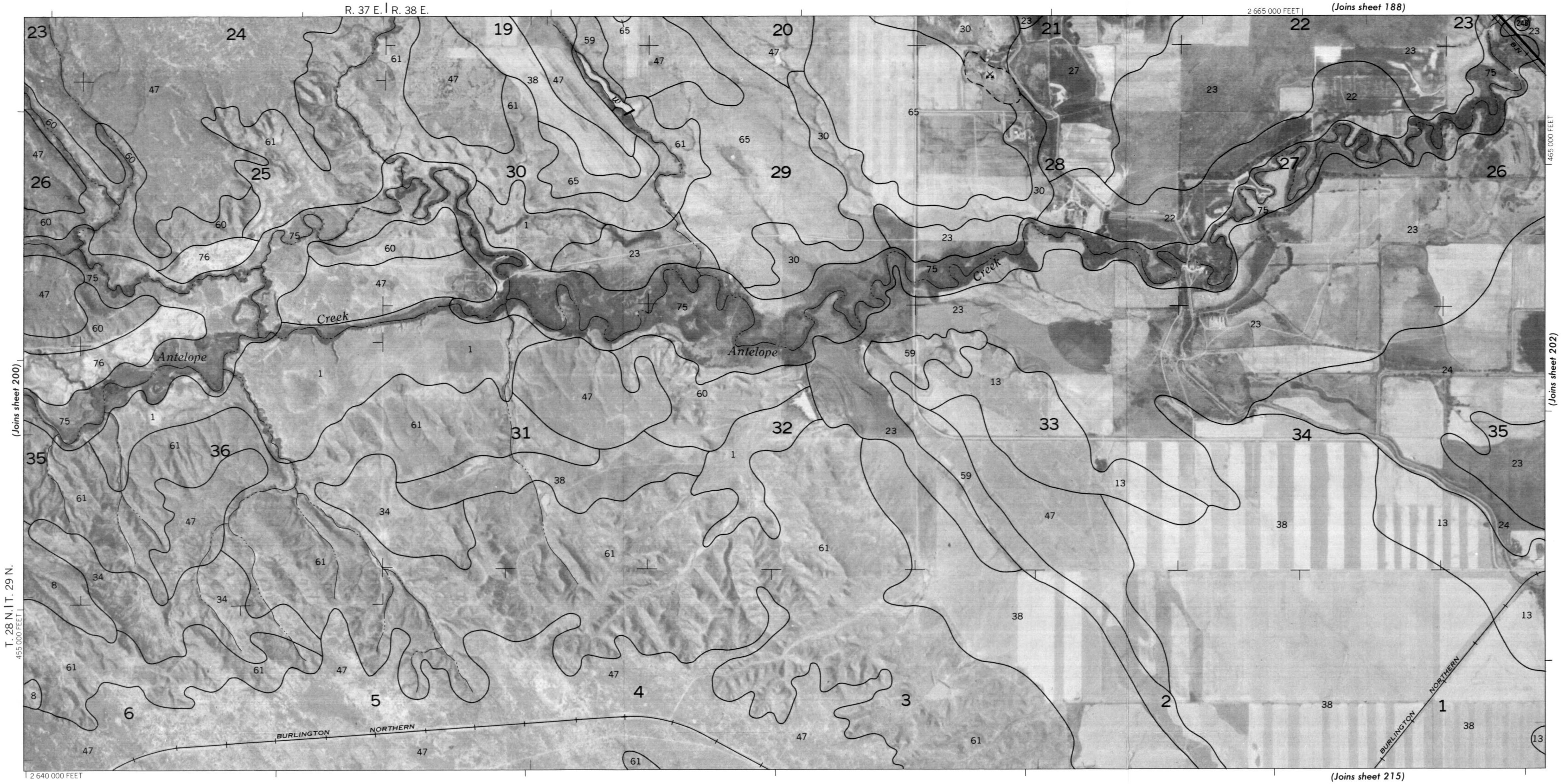
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

201

N

VALLEY COUNTY, MONTANA NO. 201

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 202

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 202

VALLEY COUNTY, MONTANA — SHEET NUMBER 203

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 203

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 204

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

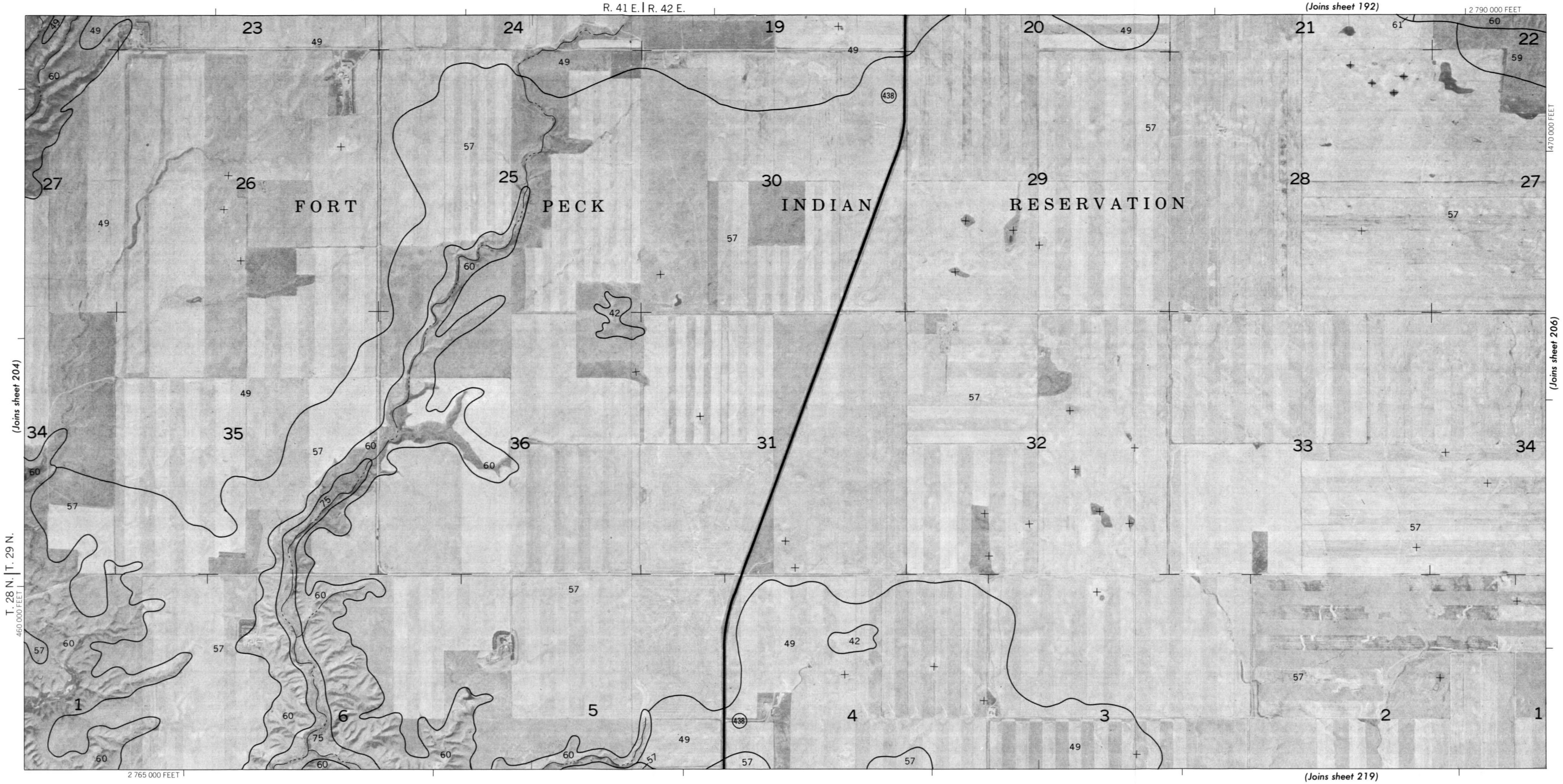
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA NO. 205

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



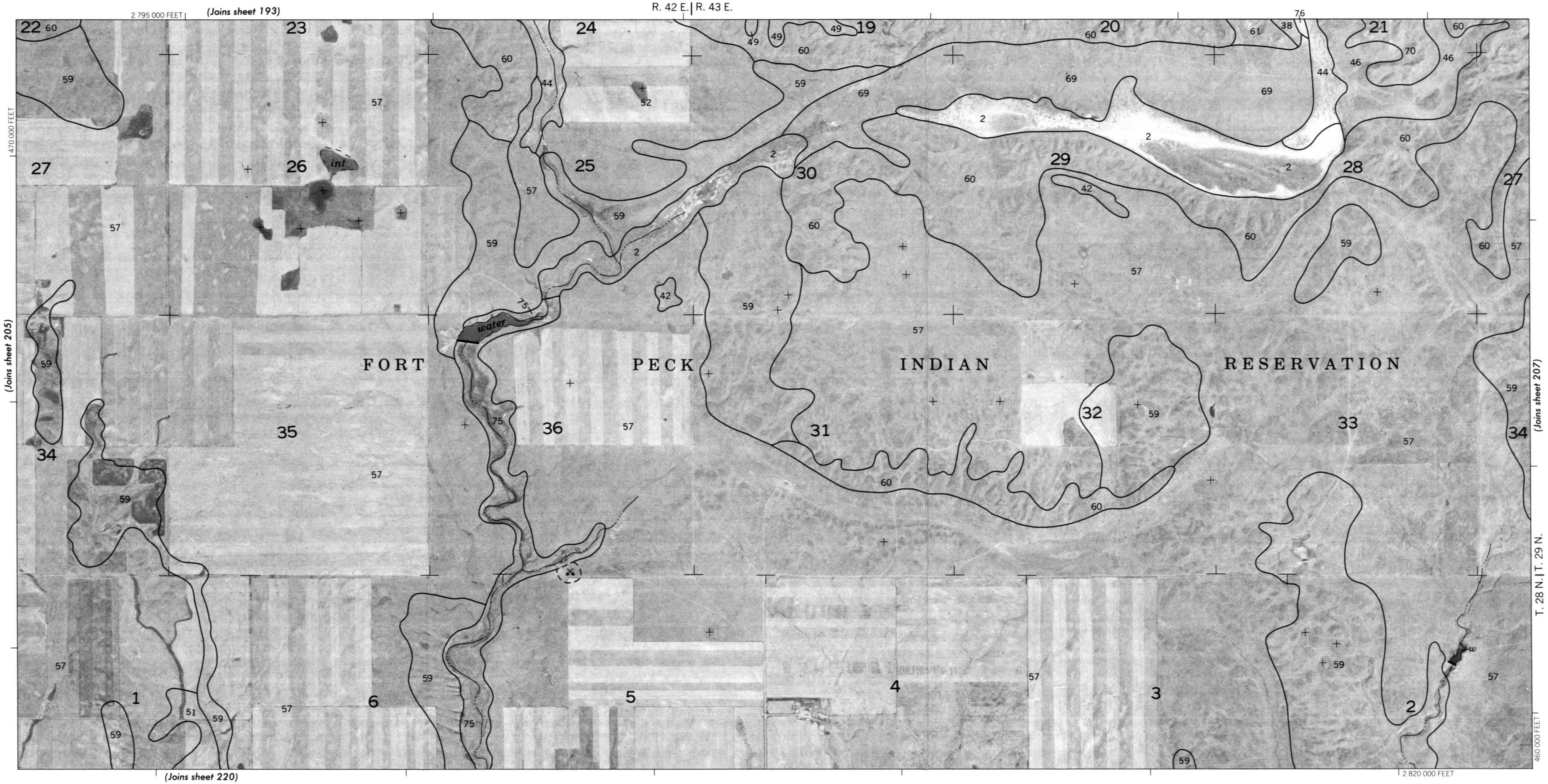
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 206



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

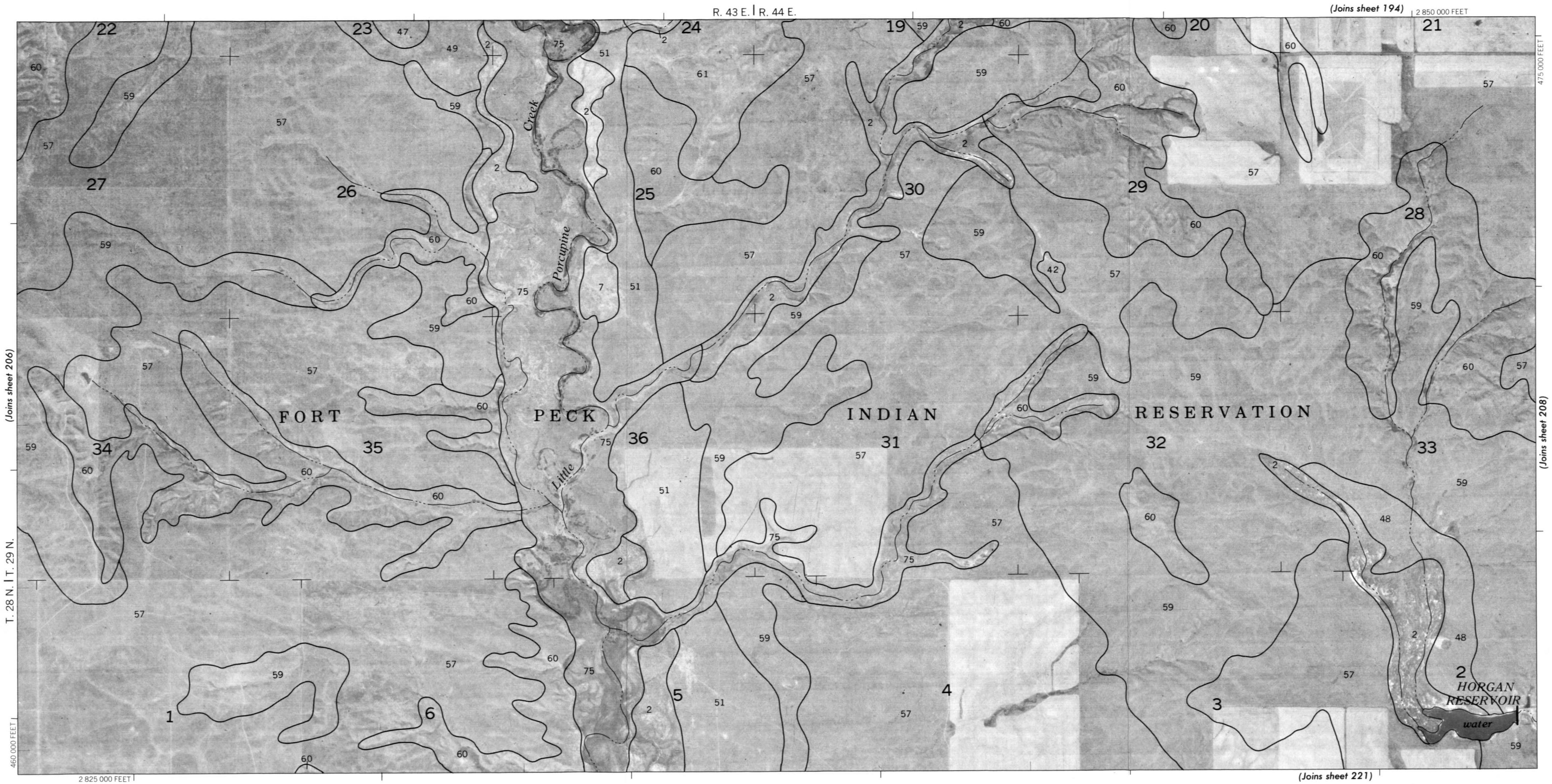
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

207

N



Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

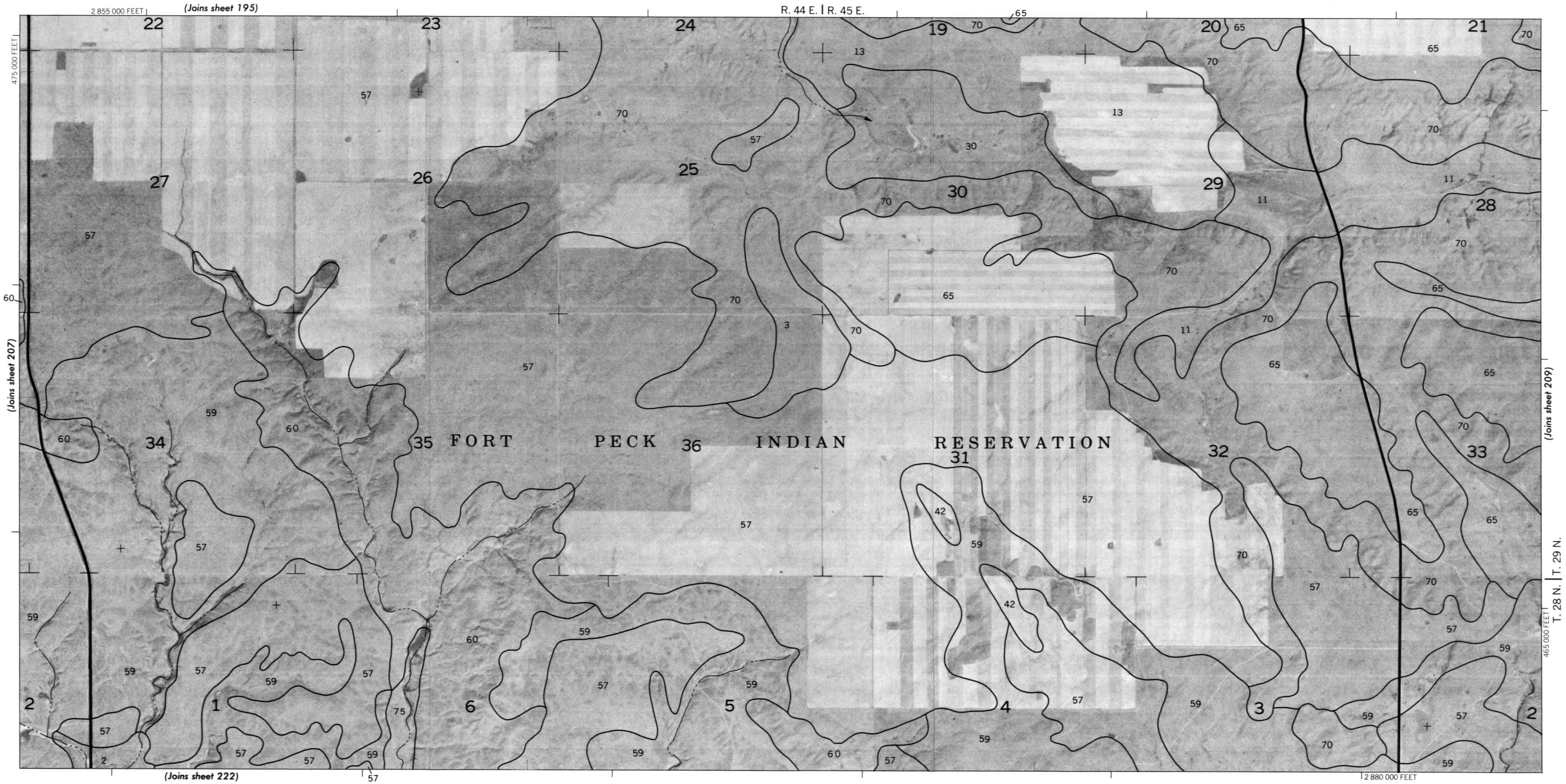
VALLEY COUNTY, MONTANA NO. 207

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

208

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 208



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

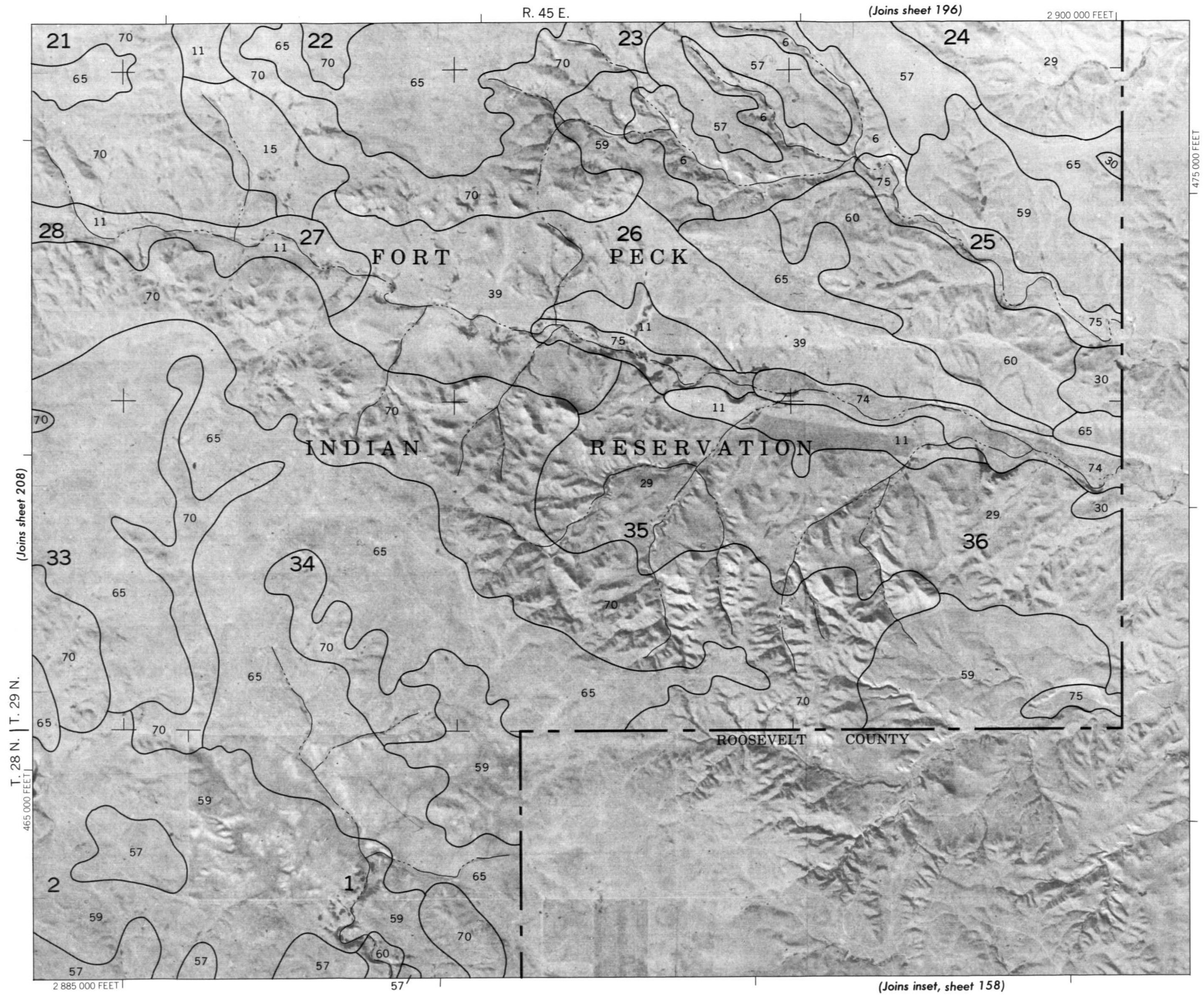
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

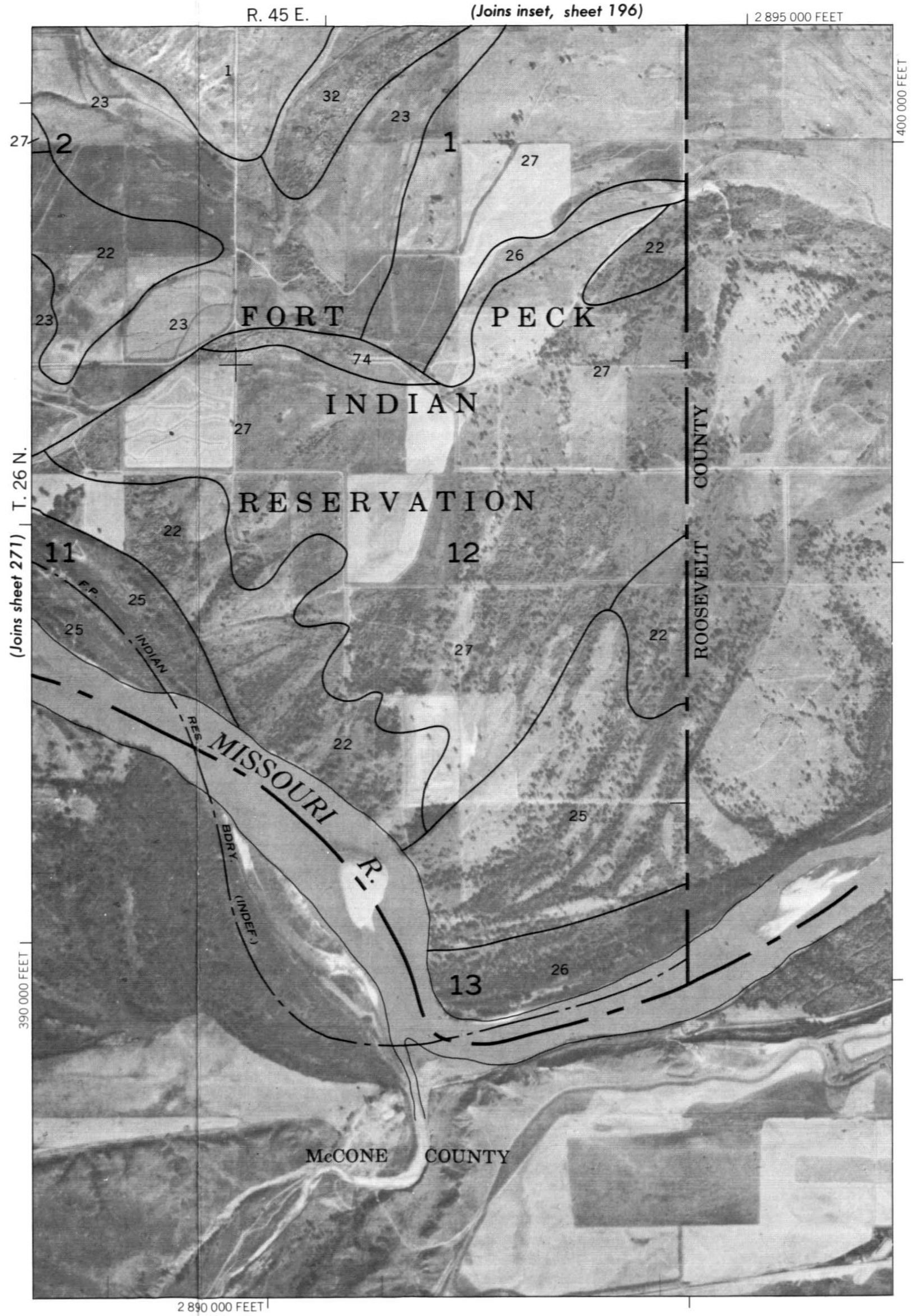
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 208

N

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned





1 ¾ ½ ¼ 0 1 2 Miles

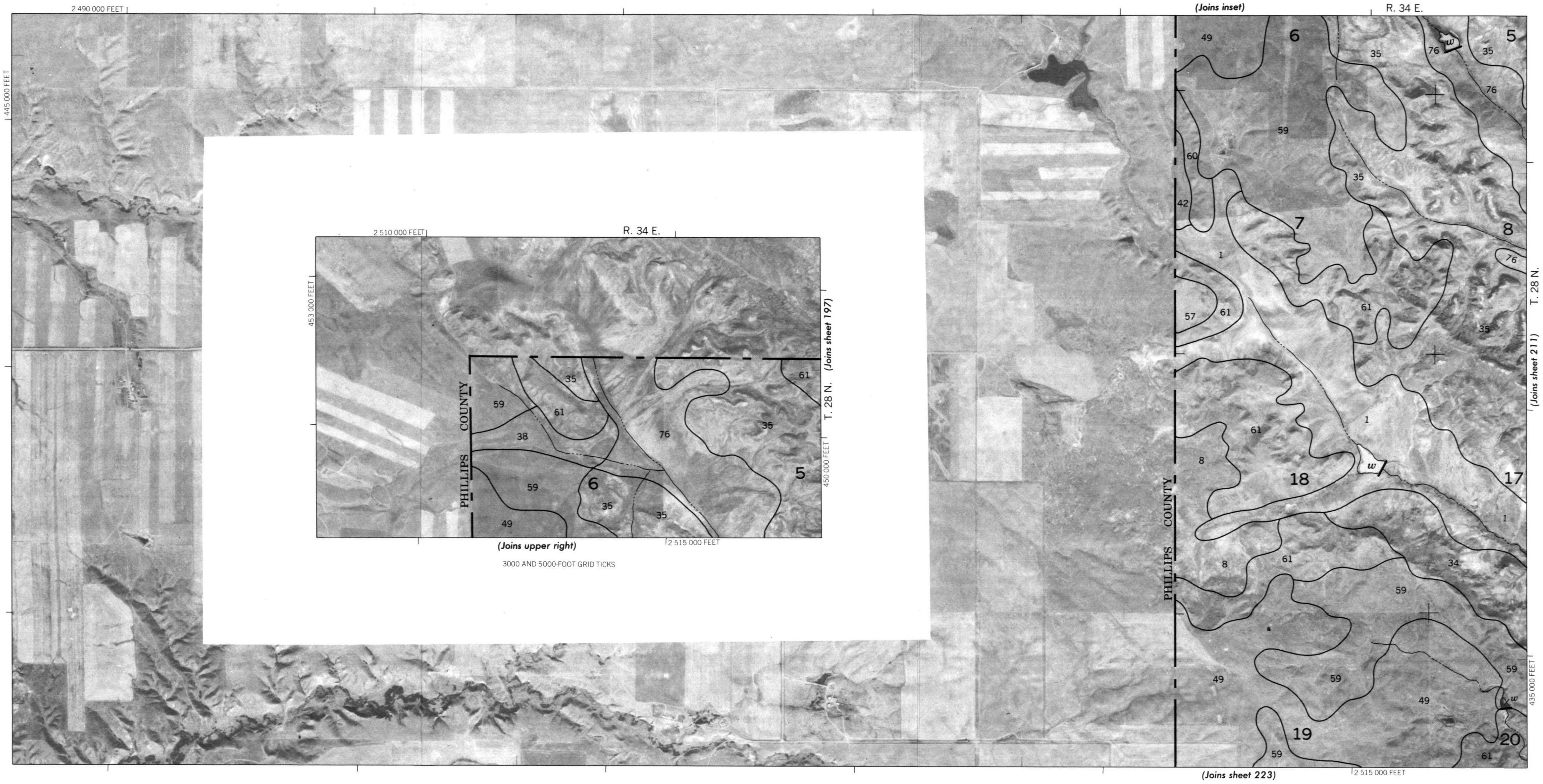
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

210

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 210



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

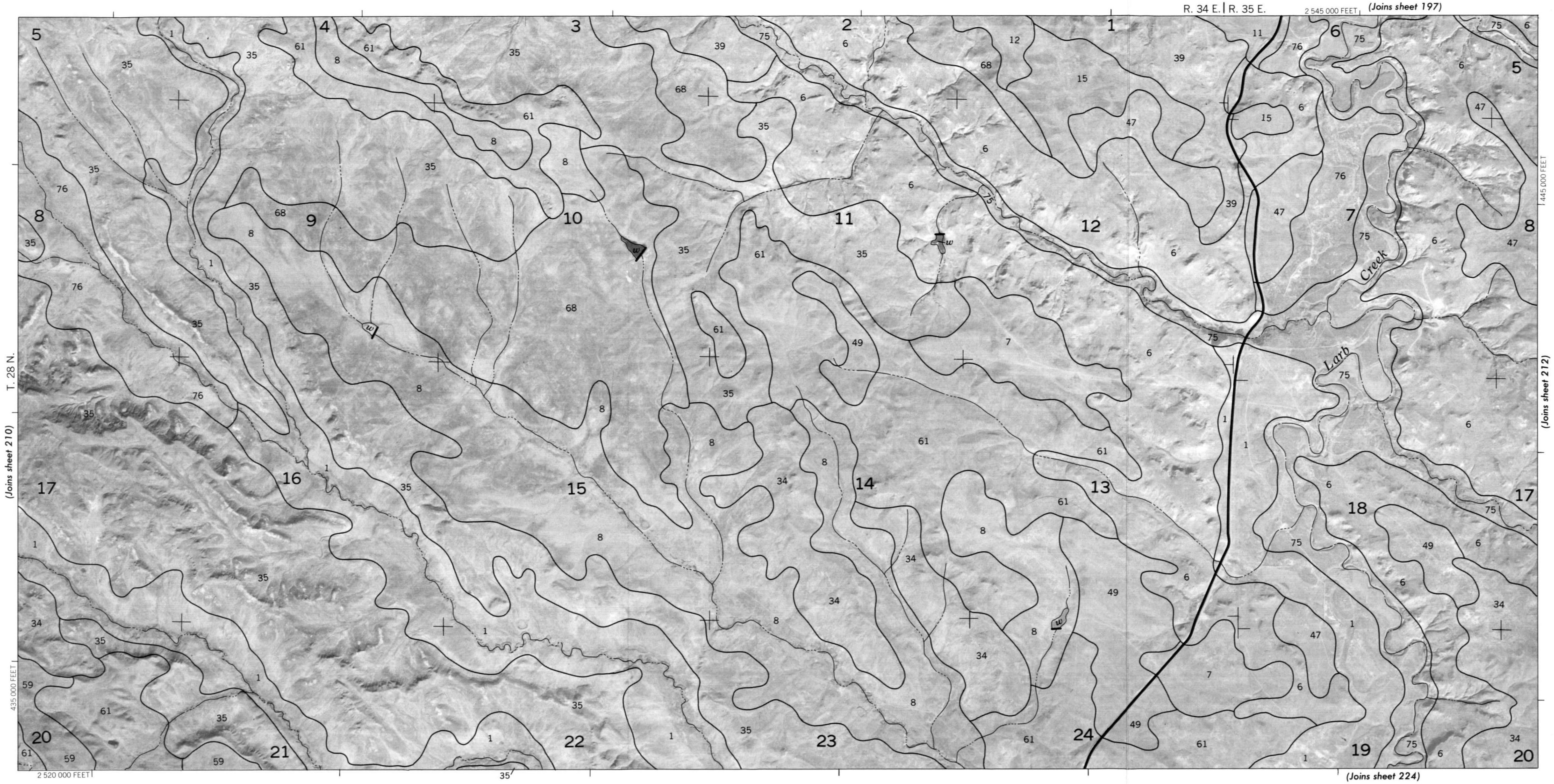
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 210

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 211

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

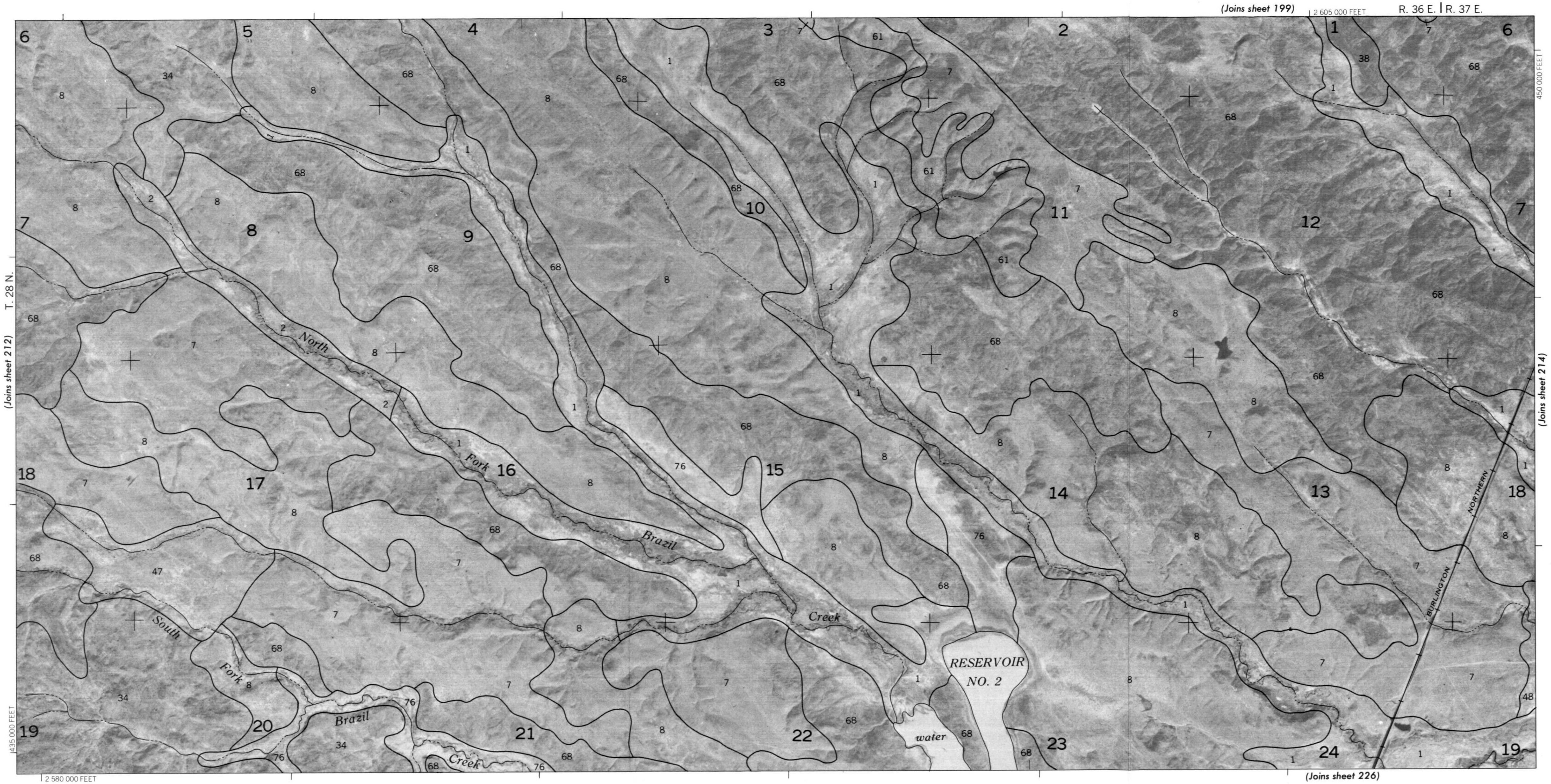
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 212

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

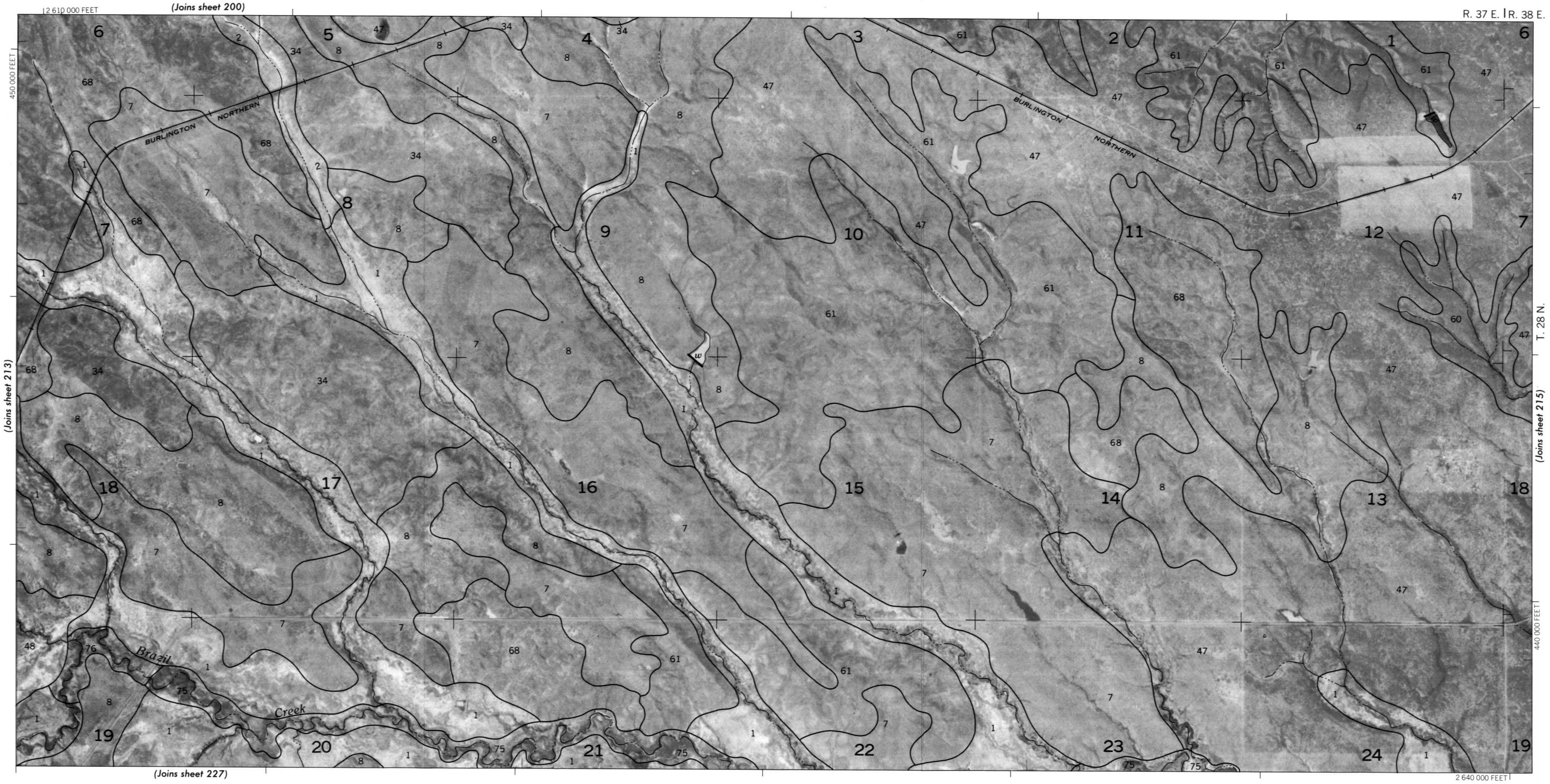
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 213

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 214

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

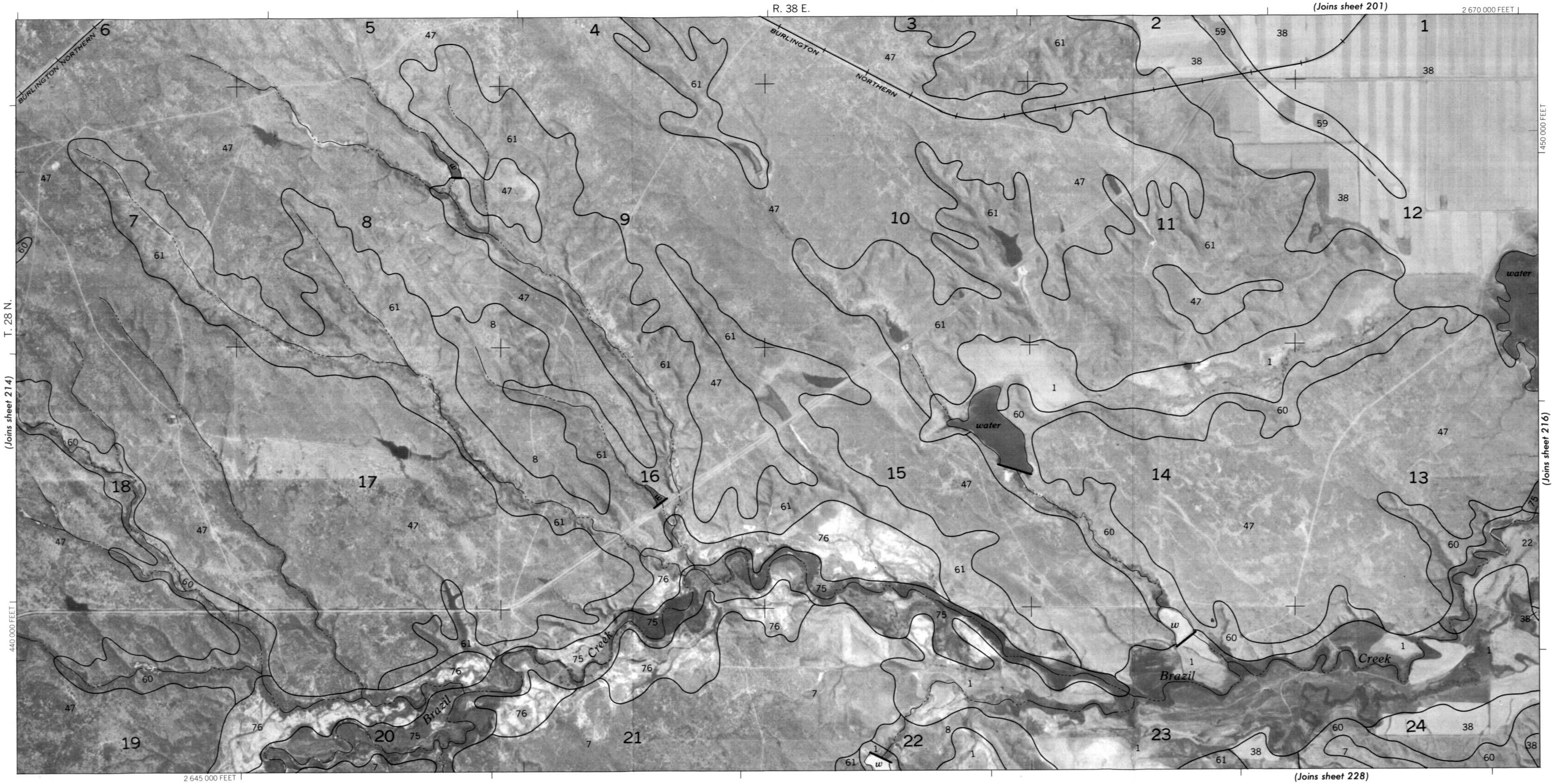
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 214

VALLEY COUNTY, MONTANA — SHEET NUMBER 215

VALLEY COUNTY, MONTANA NO. 215

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

216

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 216

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

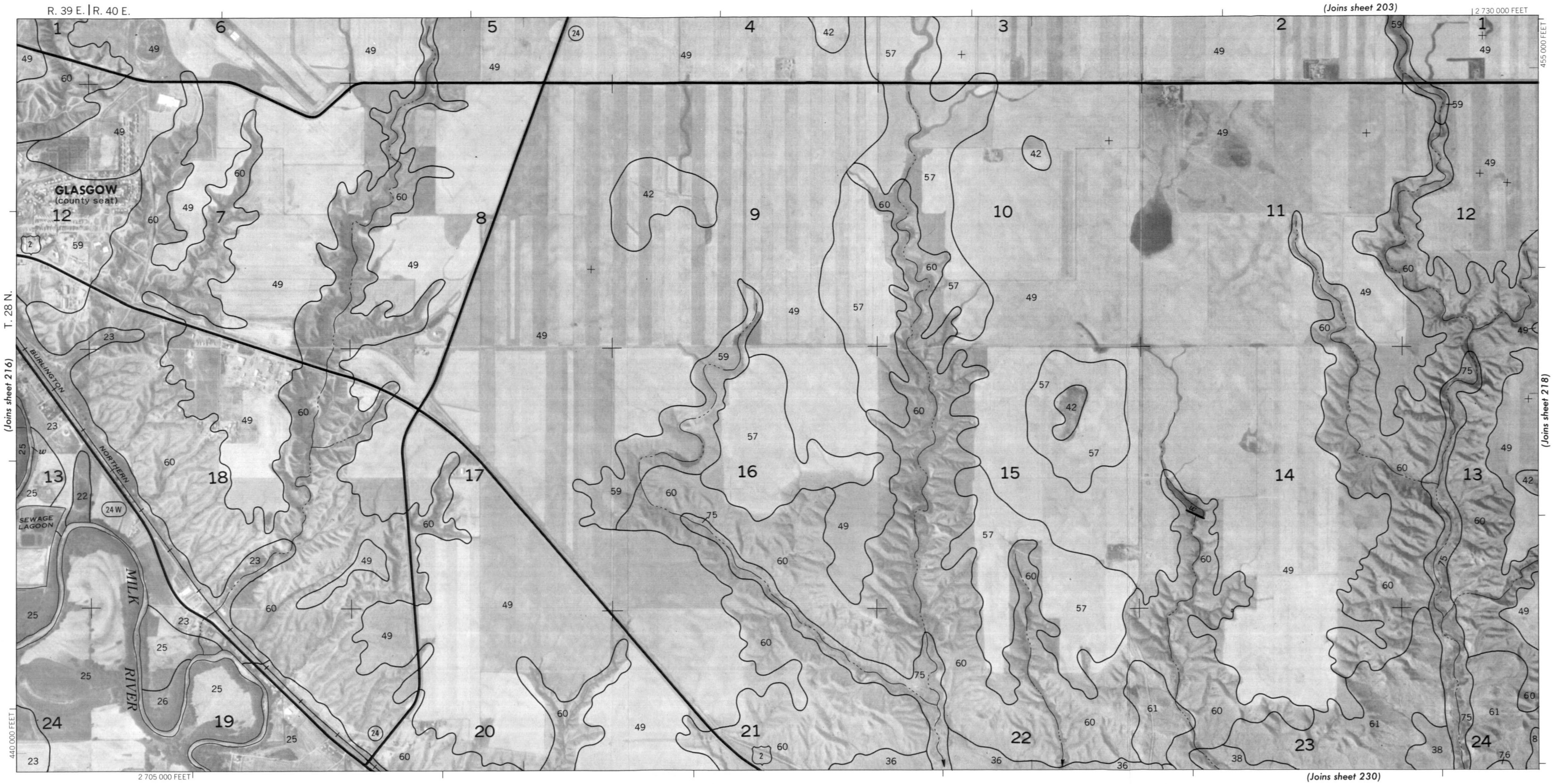
Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 216

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

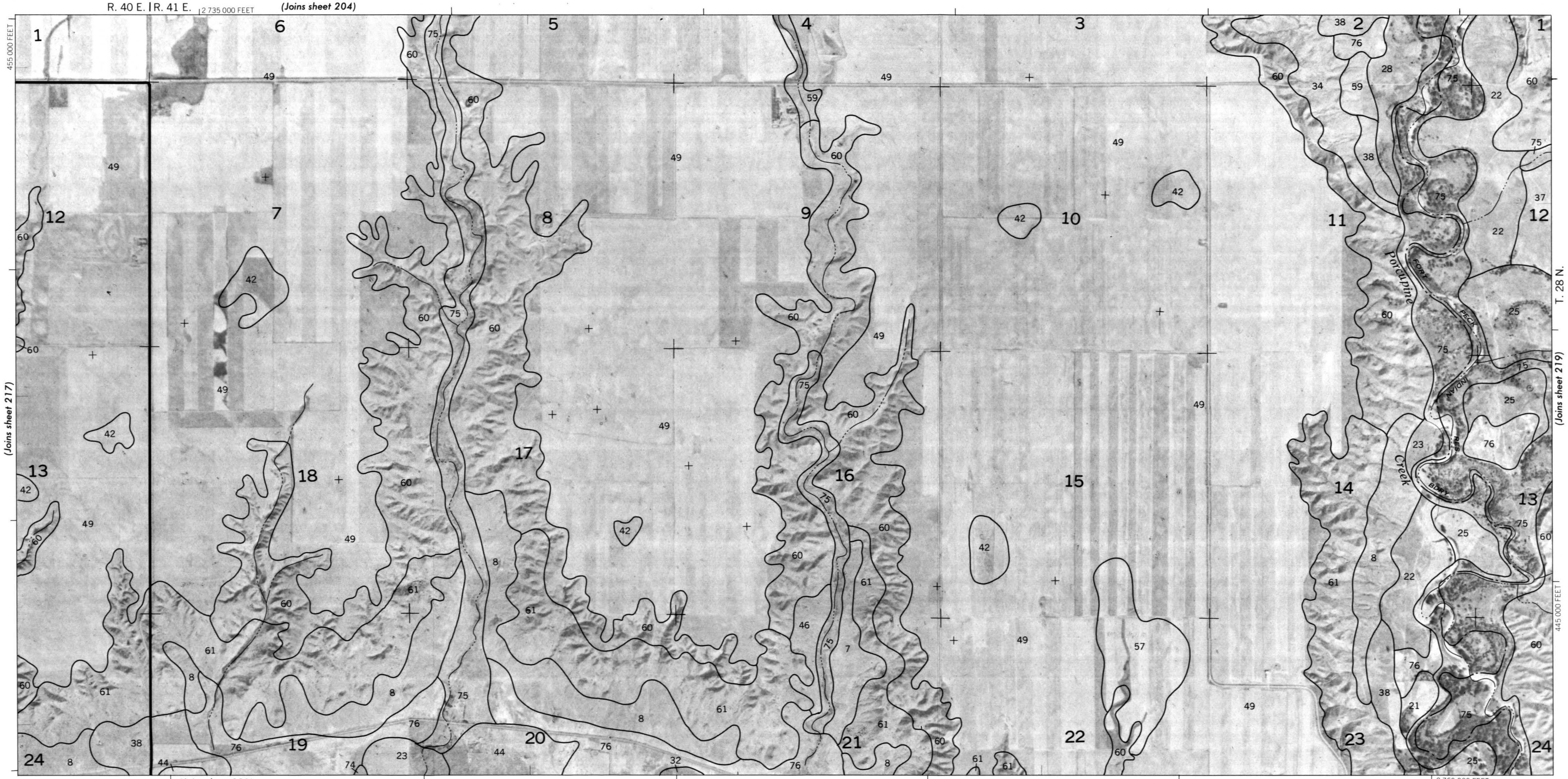
VALLEY COUNTY, MONTANA NO. 217

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 218



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 218

VALLEY COUNTY, MONTANA — SHEET NUMBER 219

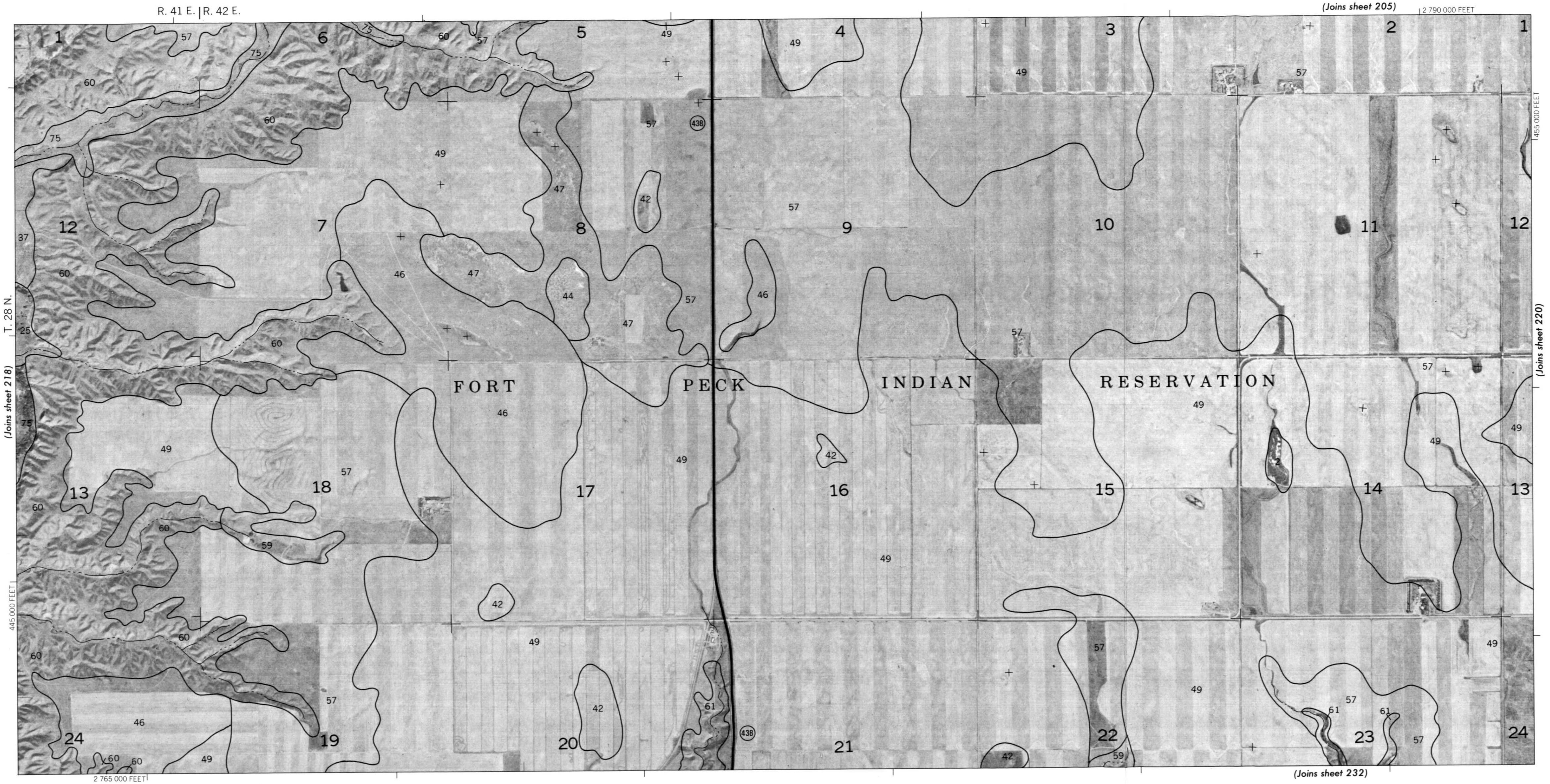
219

N

VALLEY COUNTY, MONTANA NO. 219

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 220

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

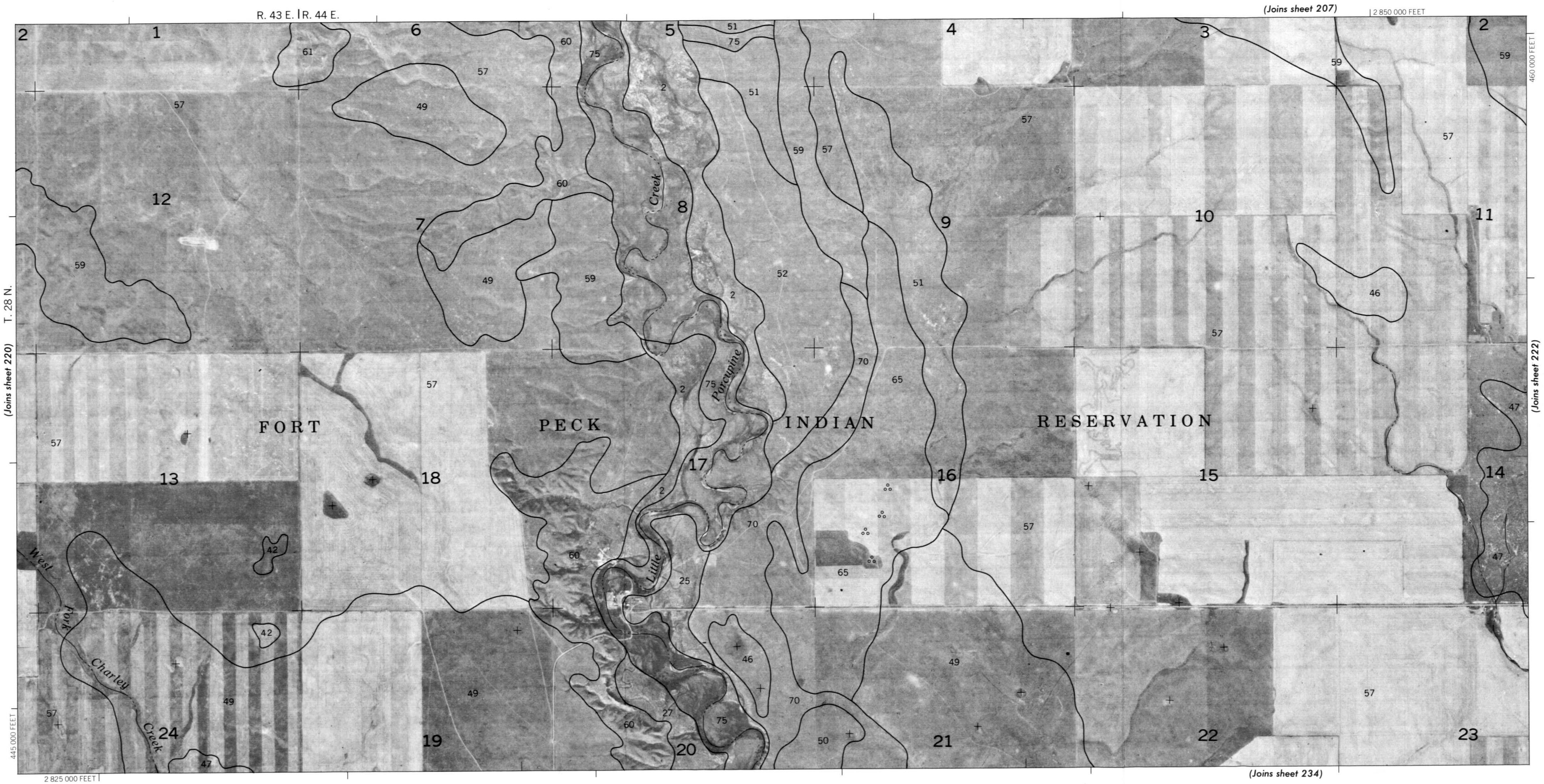
VALLEY COUNTY, MONTANA NO. 220

VALLEY COUNTY, MONTANA — SHEET NUMBER 221

VALLEY COUNTY, MONTANA NO. 221

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

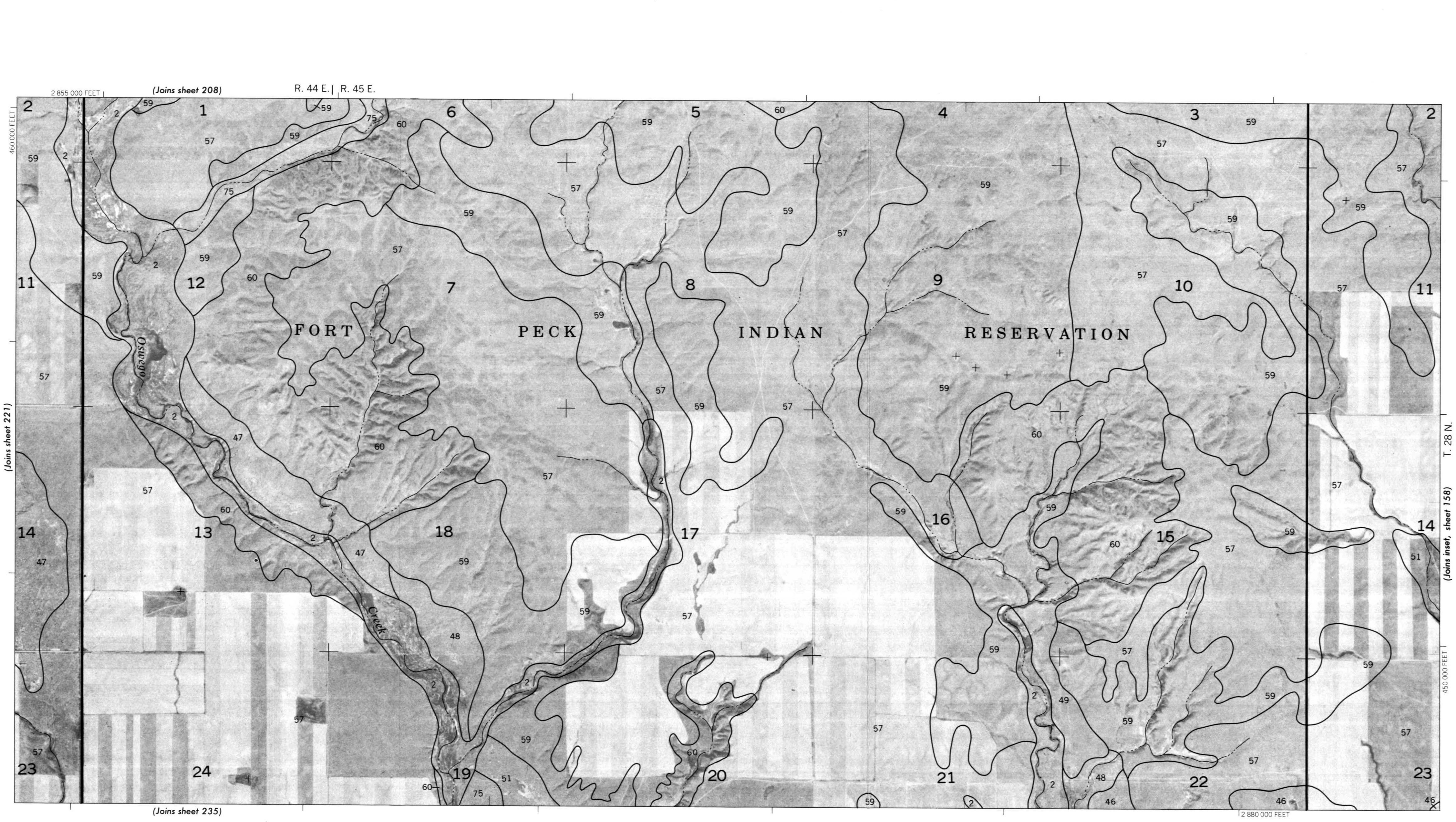


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 222



Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

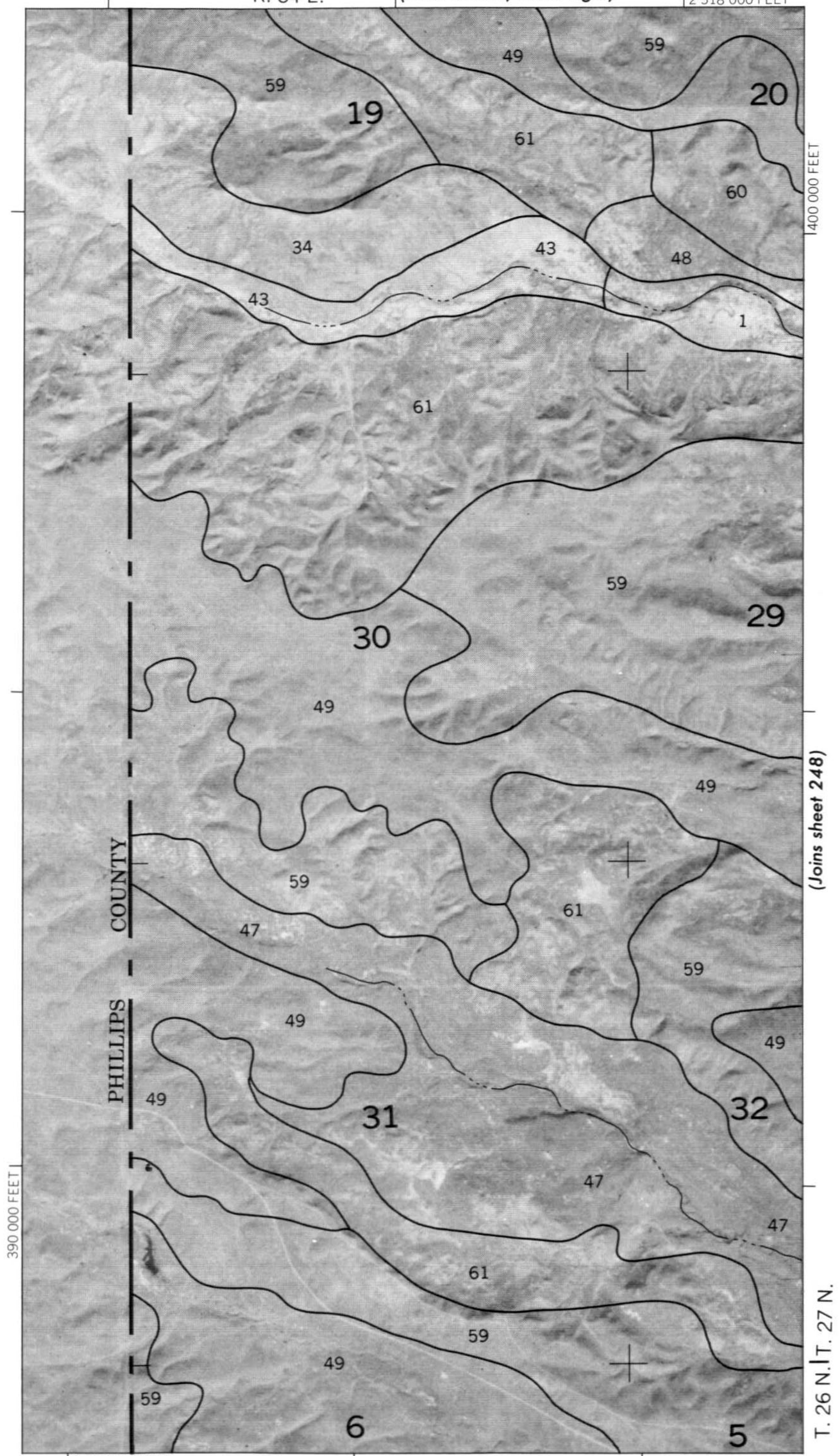
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA NO. 223

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5 000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

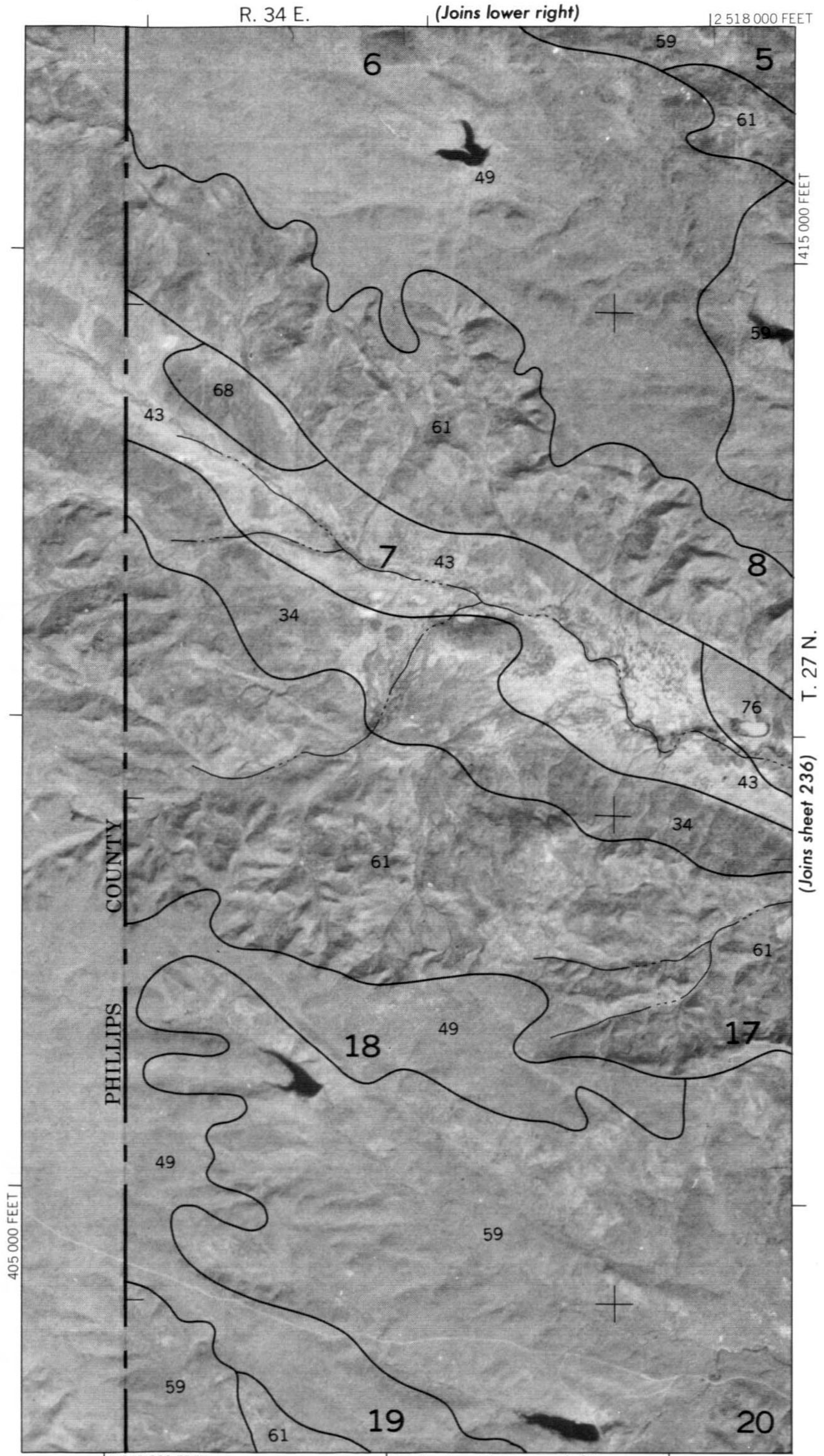
R. 34 E. *(Joins inset A, lower right)* 2 518 000 FEET



400 000 FEET
(Joins sheet 248)
390 000 FEET
T. 26 N. | T. 27 N.
2 512 000 FEET *(Joins sheet 260)*
3000 AND 5000-FOOT GRID TICKS

INSET B

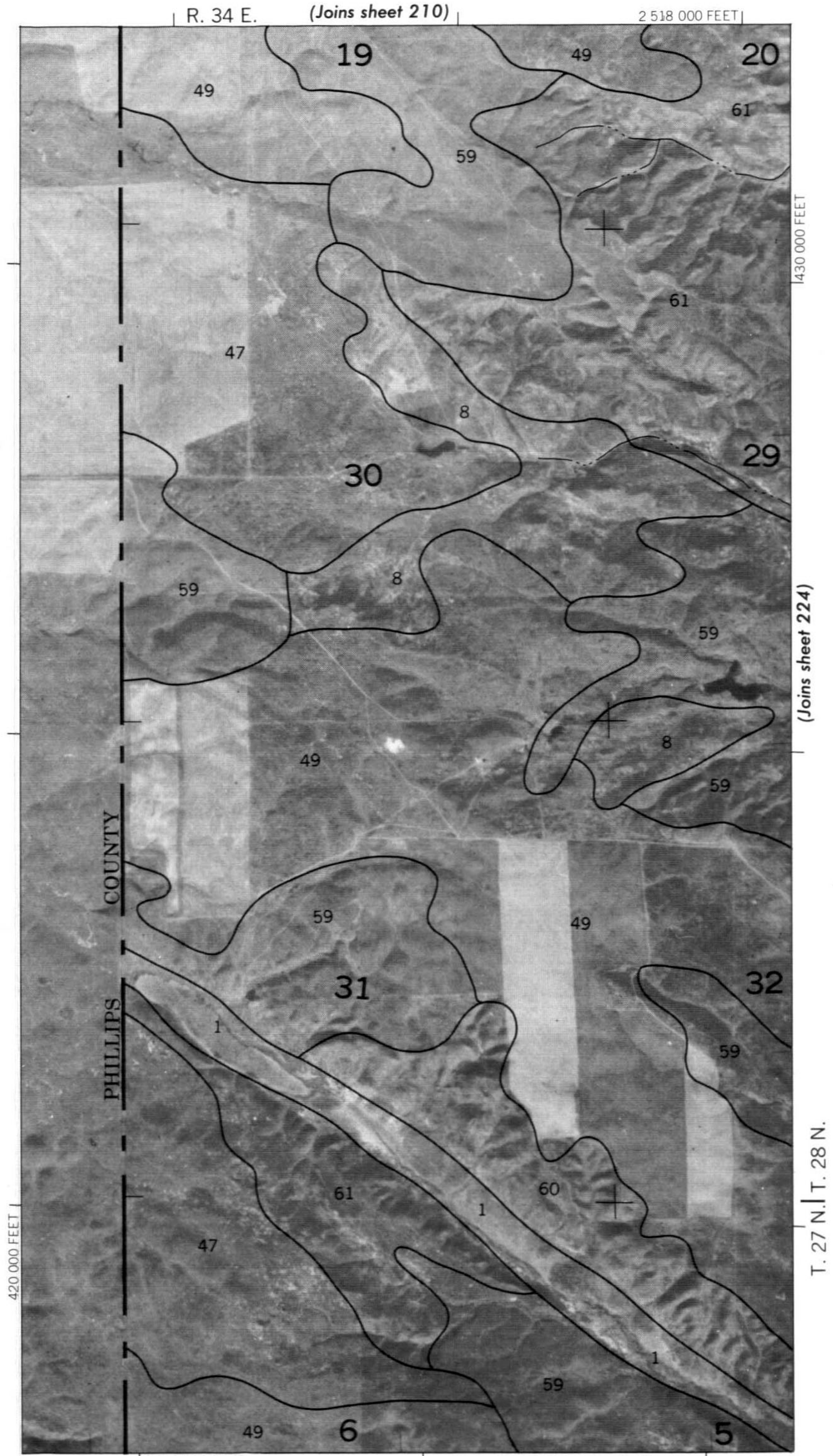
R. 34 E. *(Joins lower right)* 2 518 000 FEET



415 000 FEET
T. 27 N.
(Joins sheet 236)
405 000 FEET
2 512 000 FEET *(Joins inset B, upper left)*
3000 AND 5000-FOOT GRID TICKS

INSET A

R. 34 E. *(Joins sheet 210)* 2 518 000 FEET



430 000 FEET
(Joins sheet 224)
420 000 FEET
T. 27 N. | T. 28 N.
2 512 000 FEET *(Joins inset A, upper left)*
3000 AND 5000-FOOT GRID TICKS

1 ¾ ½ ¼ 0 1 2 Miles

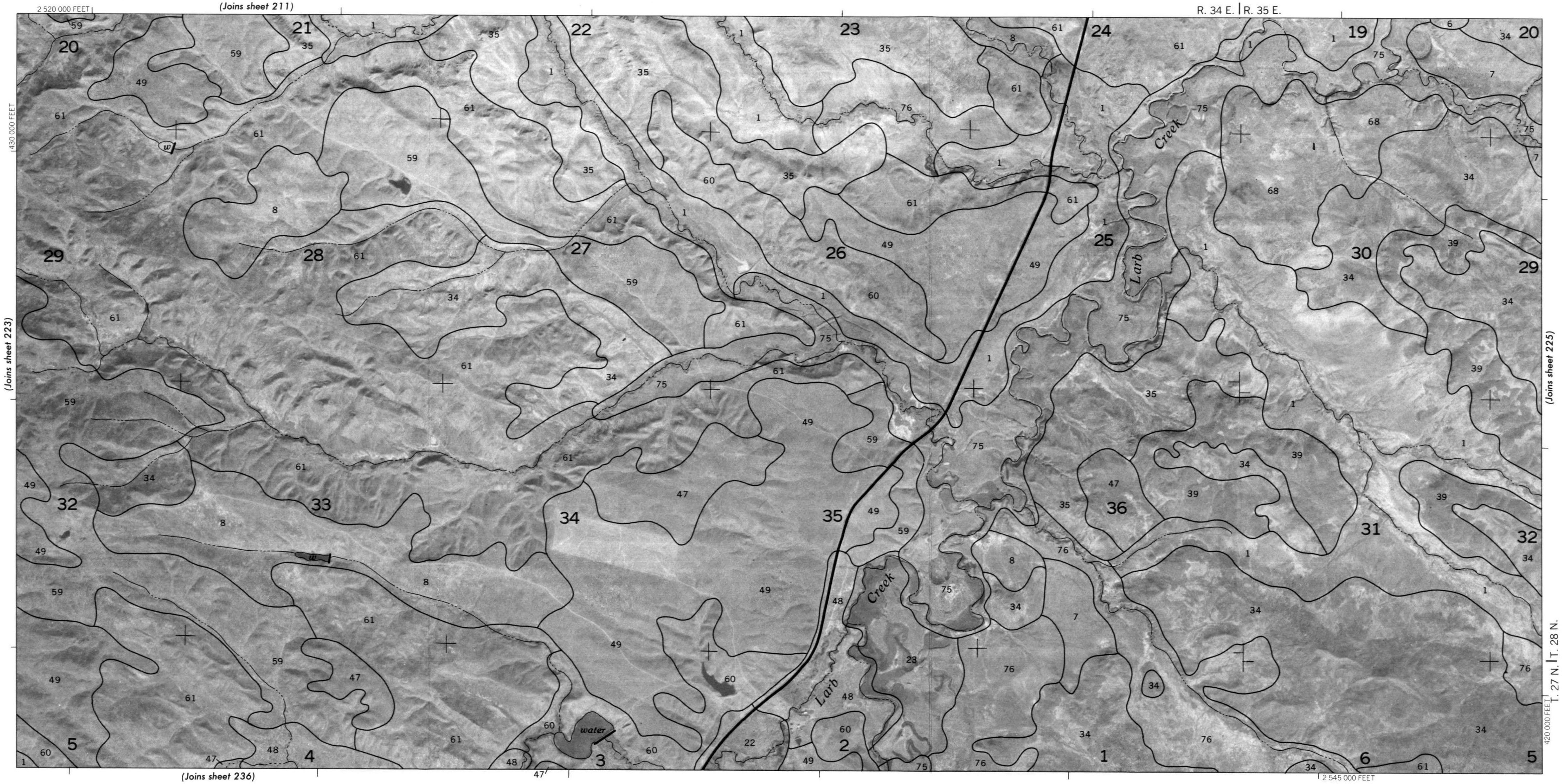
5000 4000 3000 2000 1000 0 5000 10 000 Feet

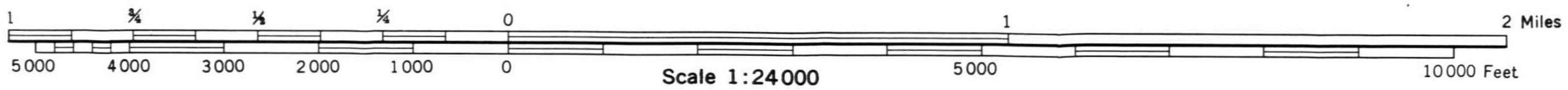
Scale 1:24 000

224

VALLEY COUNTY, MONTANA — SHEET NUMBER 224

N





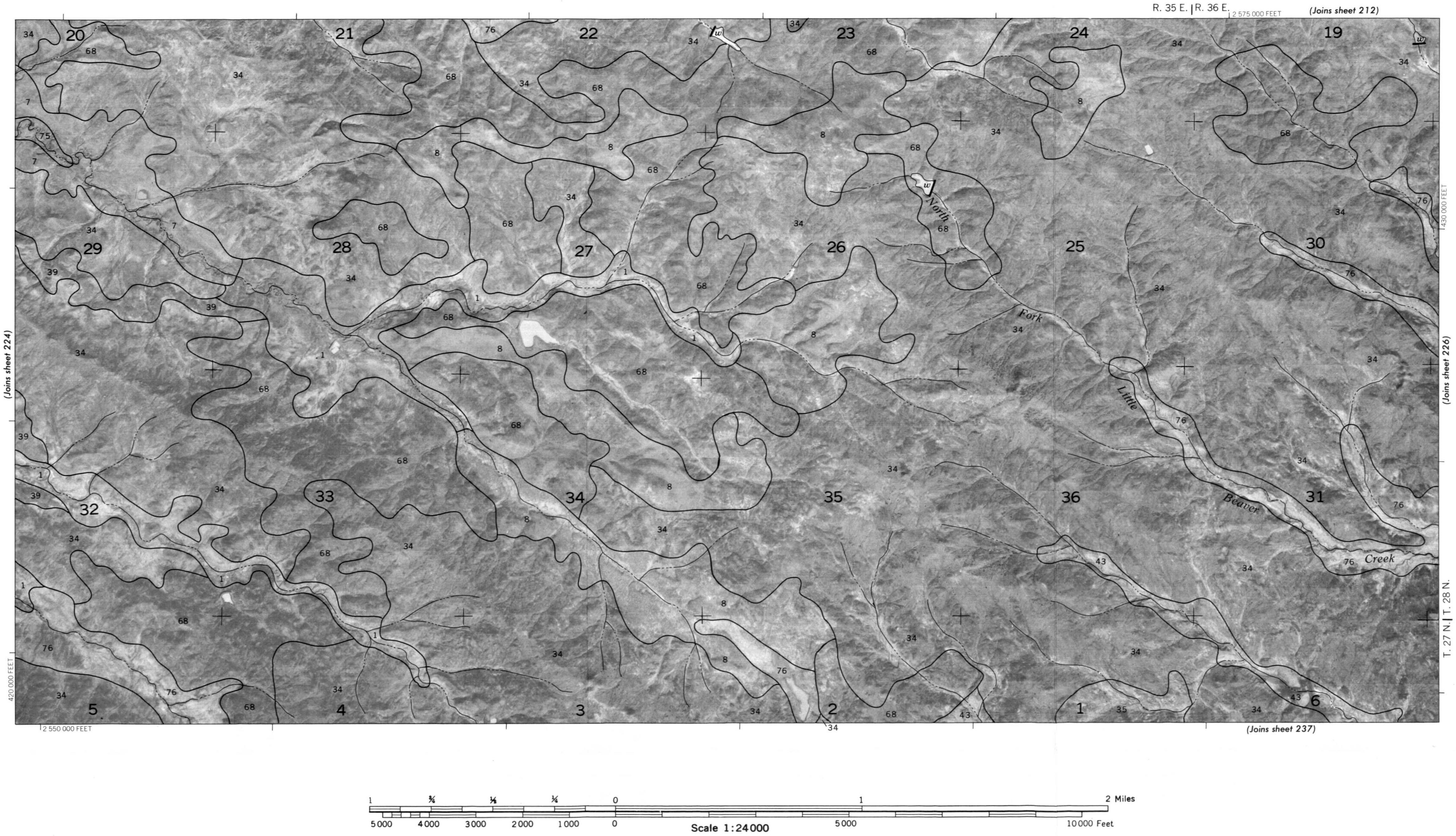
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 224

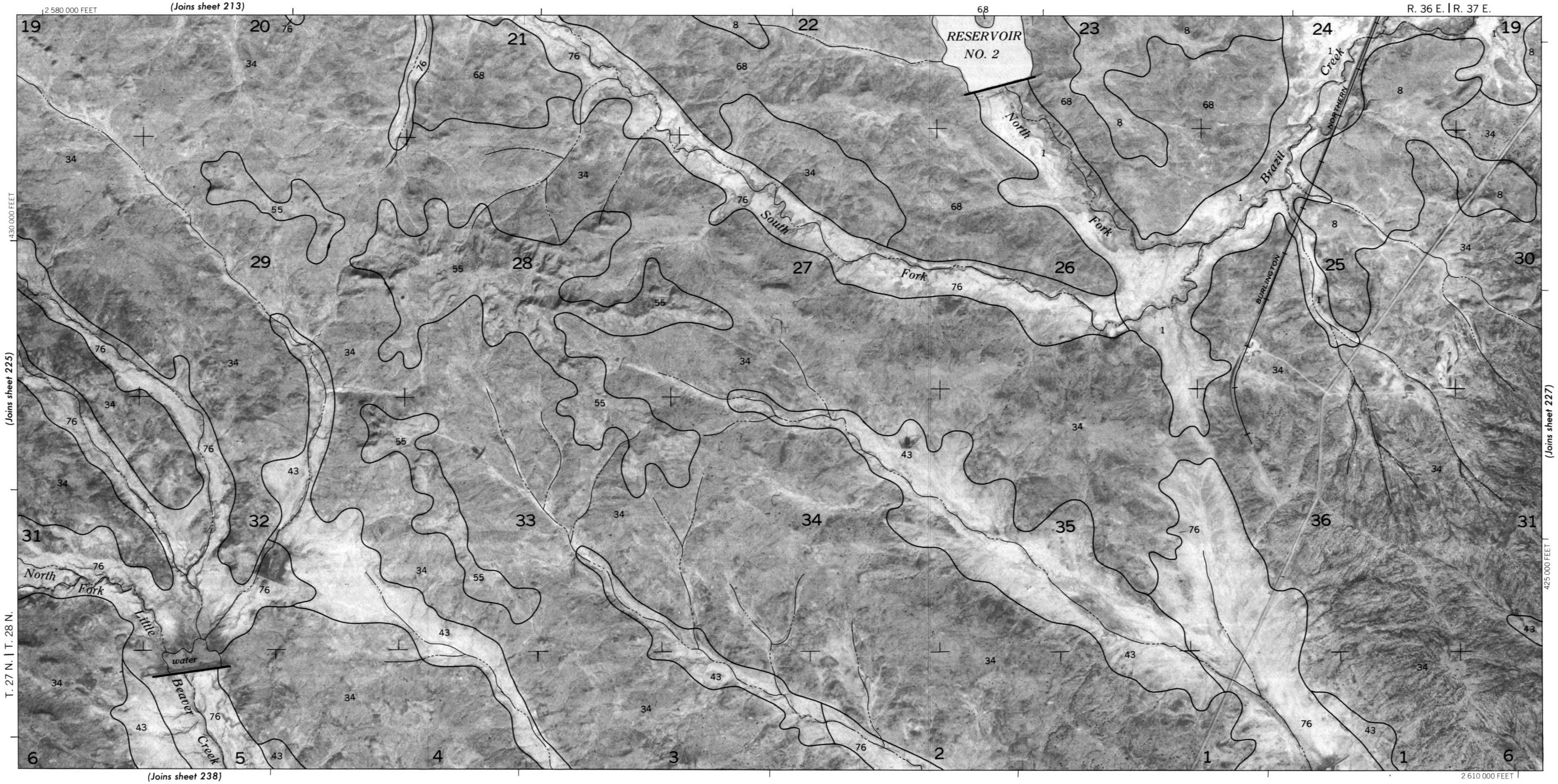
VALLEY COUNTY, MONTANA NO. 225

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



N

VALLEY COUNTY, MONTANA — SHEET NUMBER 226



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA NO. 227

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 228

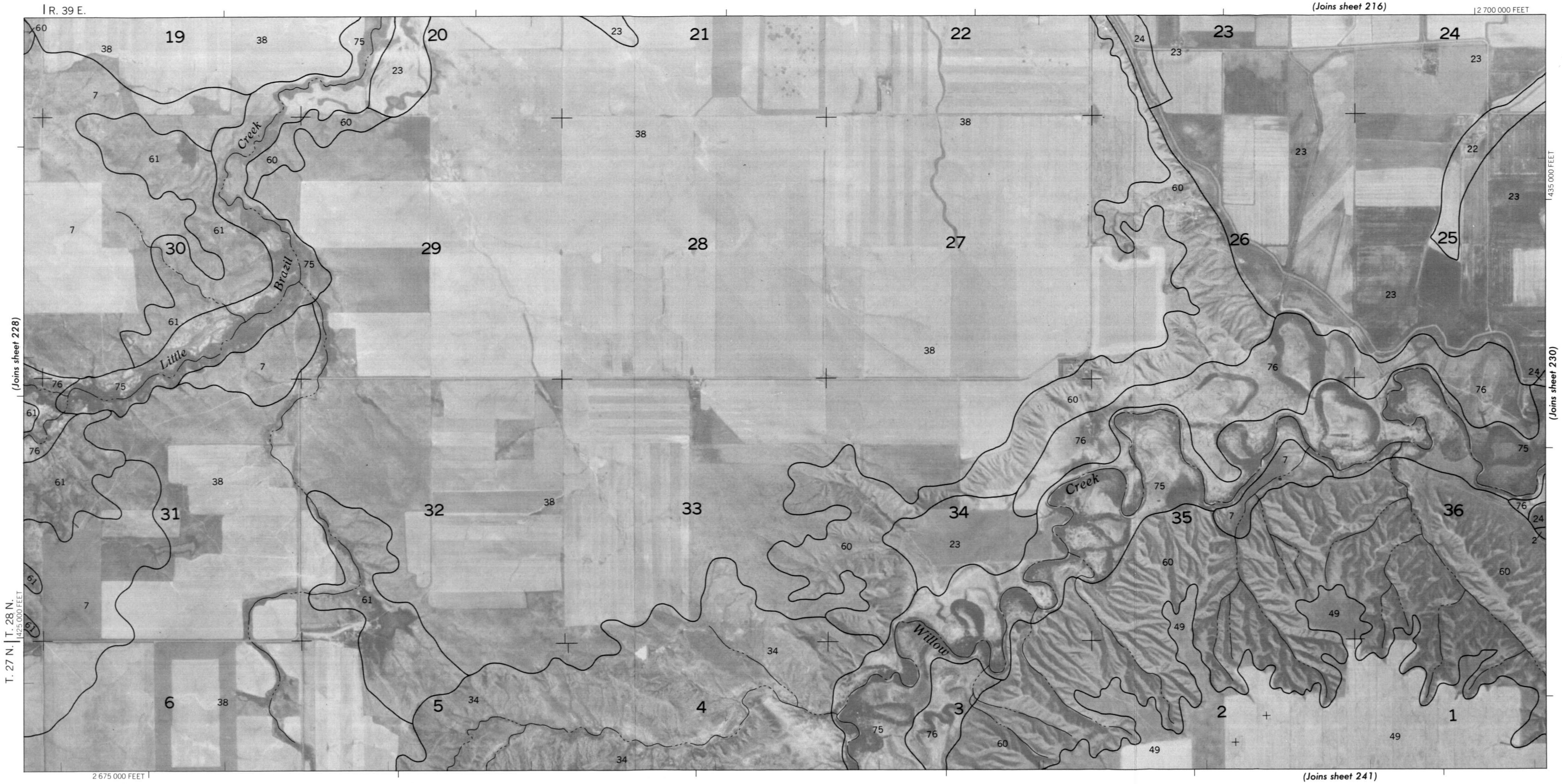
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA NO. 229

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



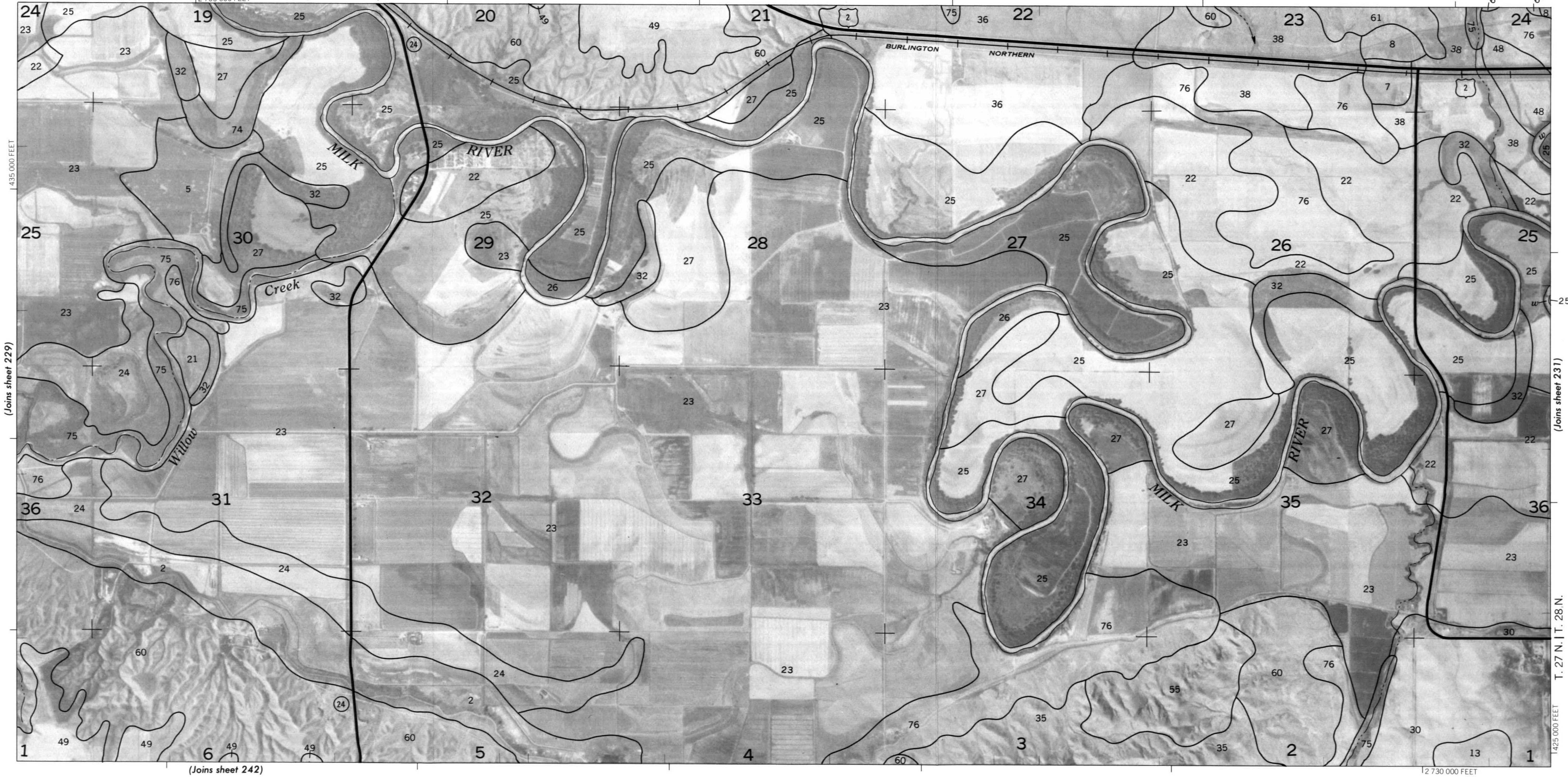
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 230

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

231

N

VALLEY COUNTY, MONTANA NO. 231

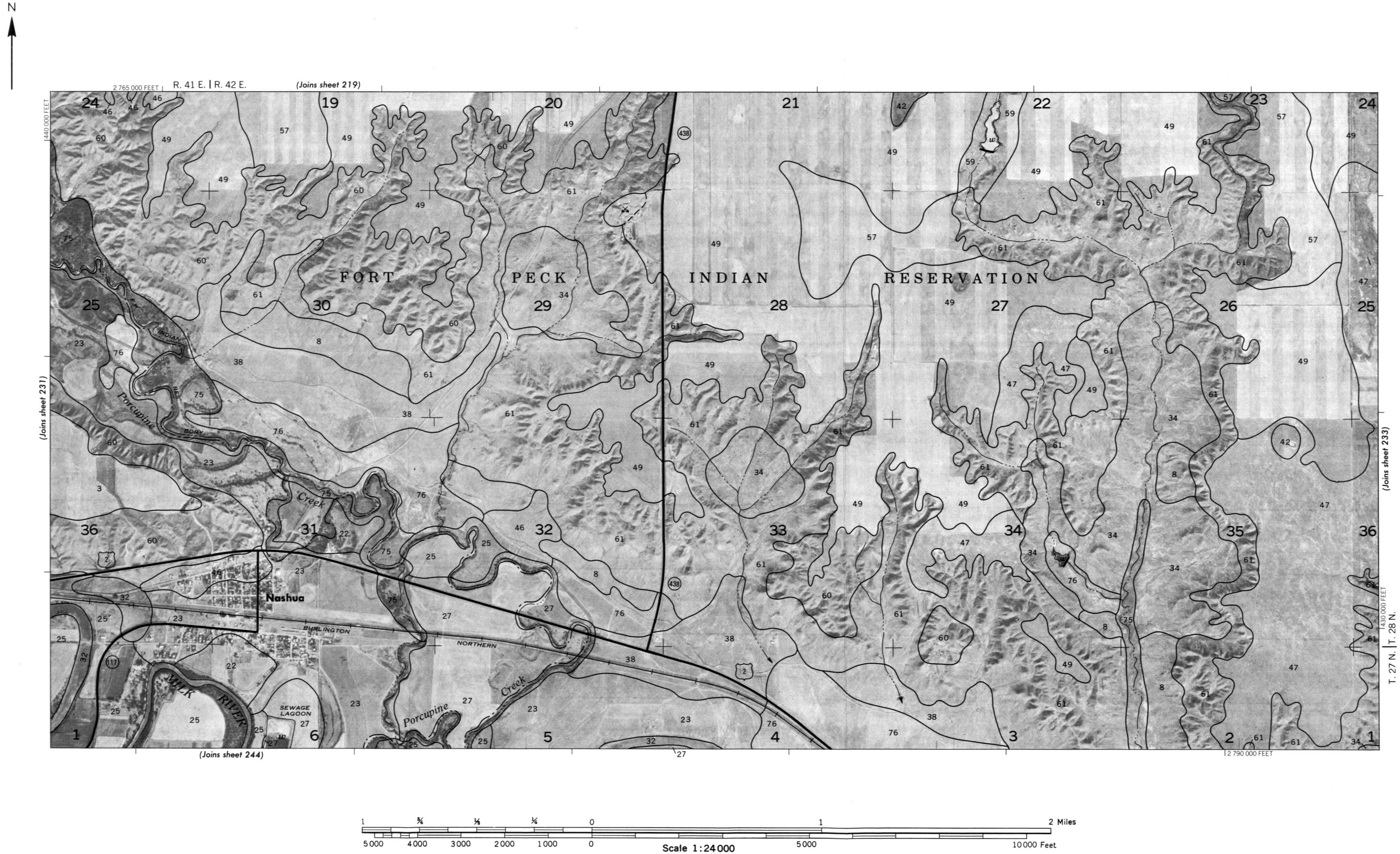
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

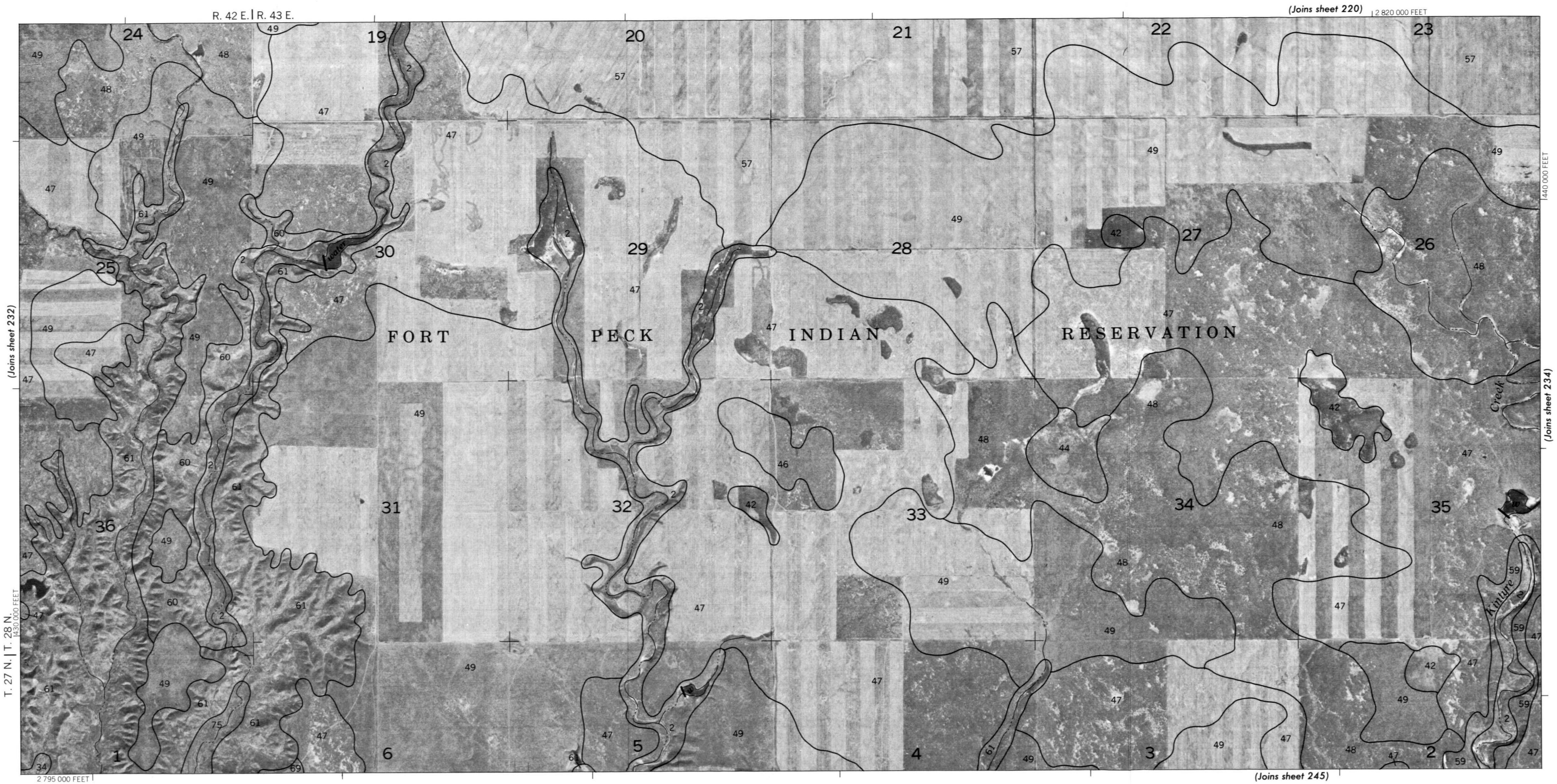
VALLEY COUNTY, MONTANA — SHEET NUMBER 232



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA — SHEET NUMBER 233



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

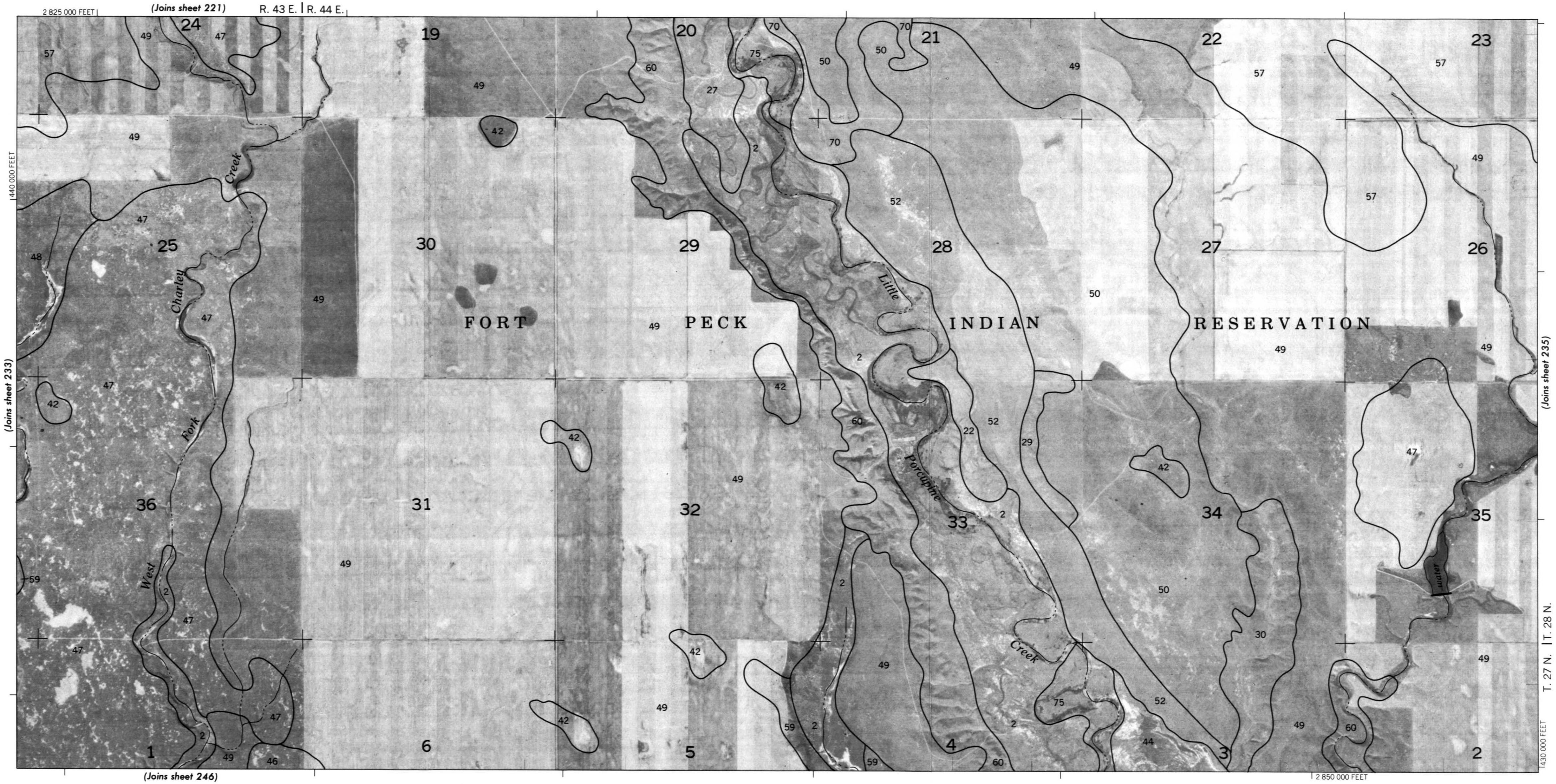
Scale 1:24 000

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

234

VALLEY COUNTY, MONTANA — SHEET NUMBER 234

N



1 ¾ ½ ¼ 0 1 2 Miles

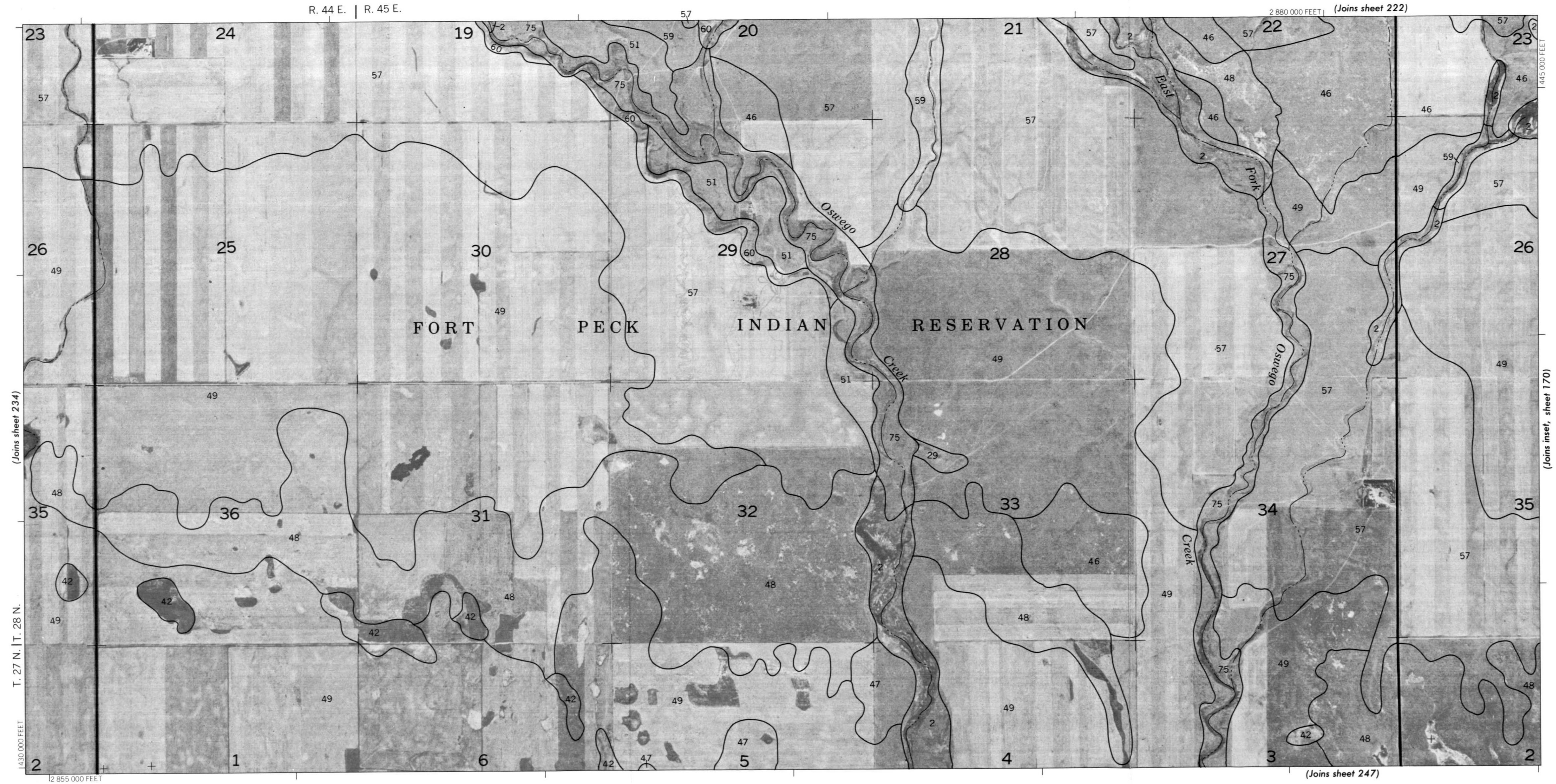
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 234



Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

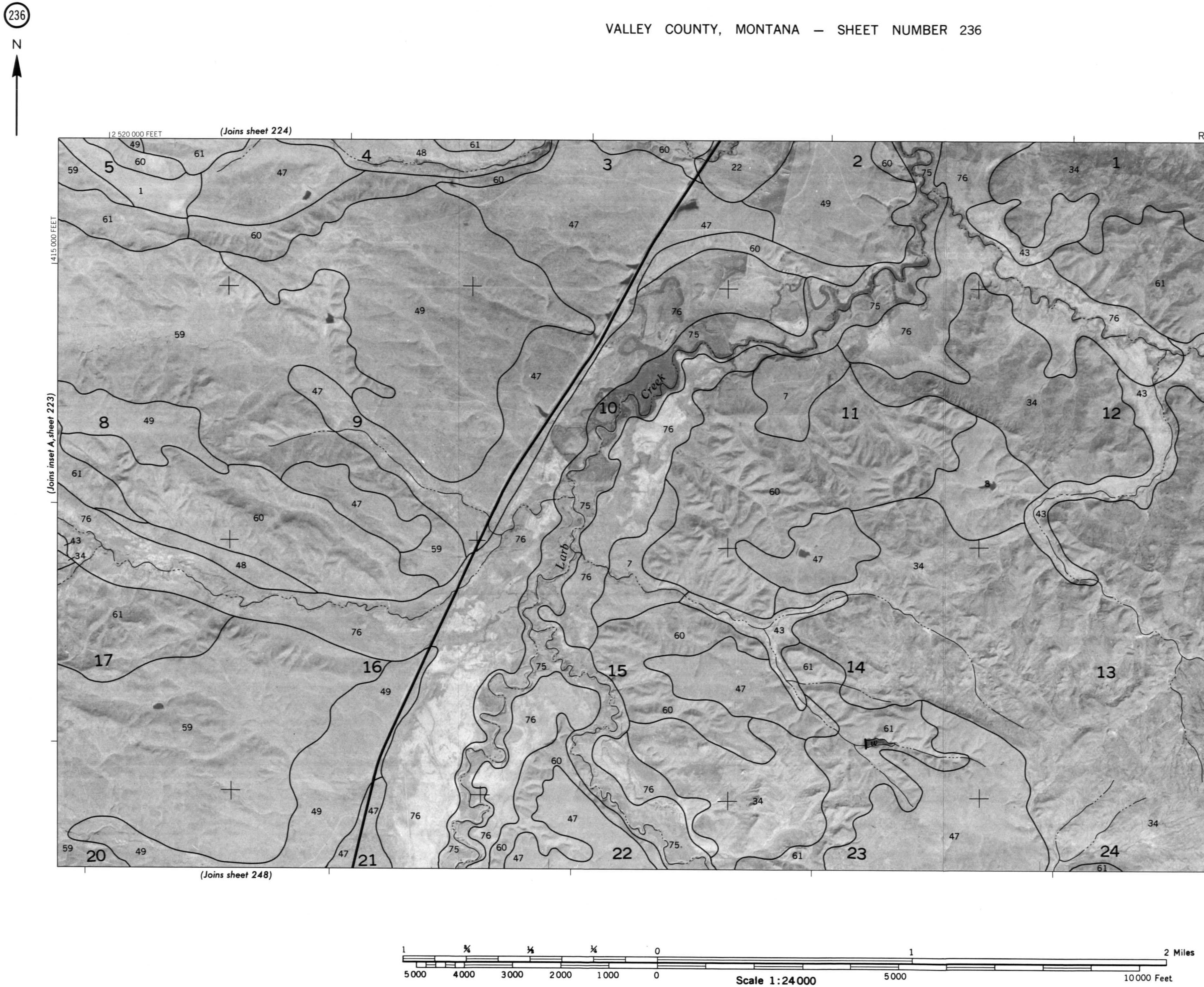
5000 4000 3000 2000 1000 0 5000 10000 Feet

VALLEY COUNTY, MONTANA NO. 235

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 236



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA NO. 237

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5 000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

1 ¾ ½ ¼ 0 1 2 Miles

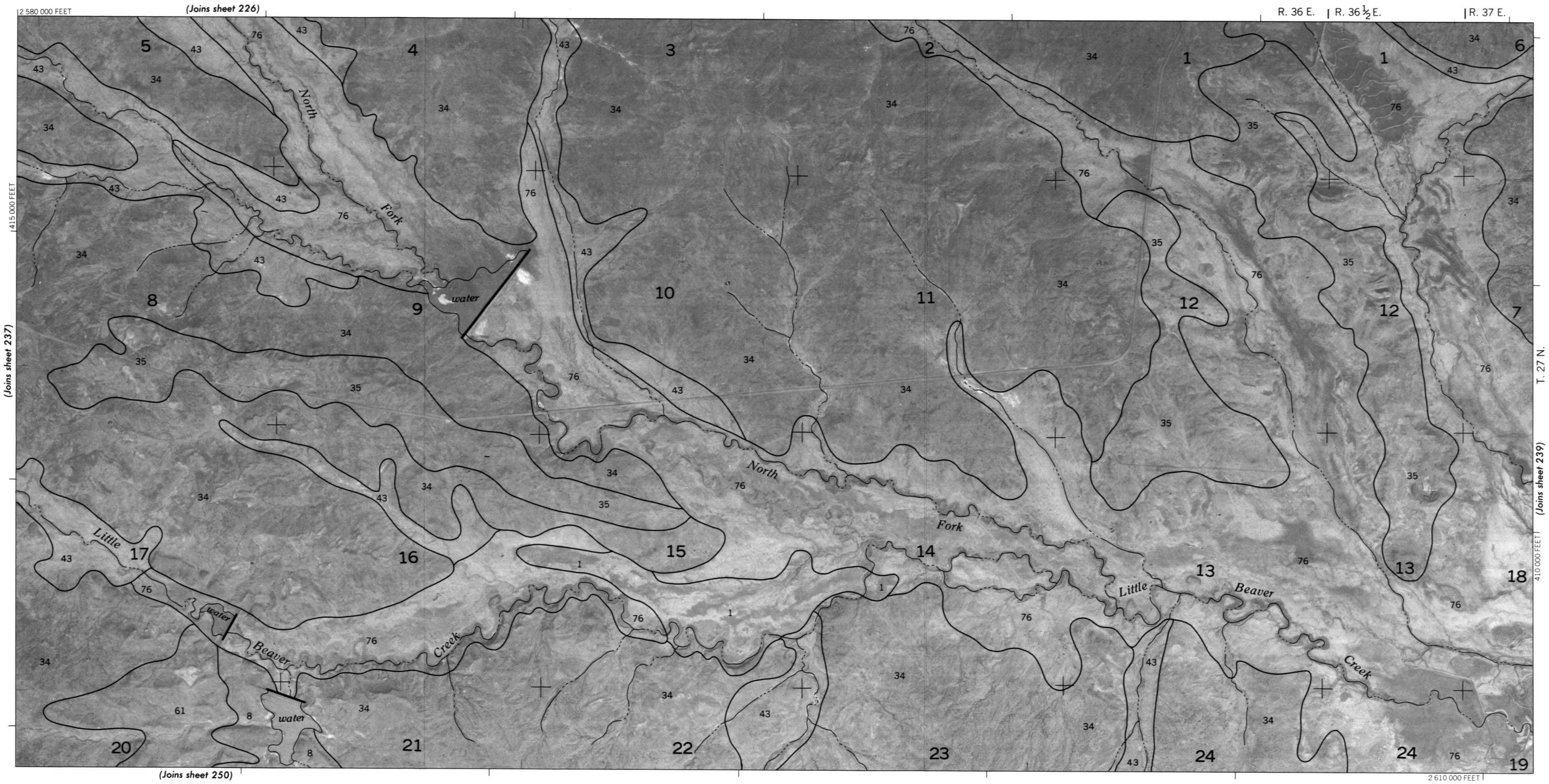
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

238

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 238



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

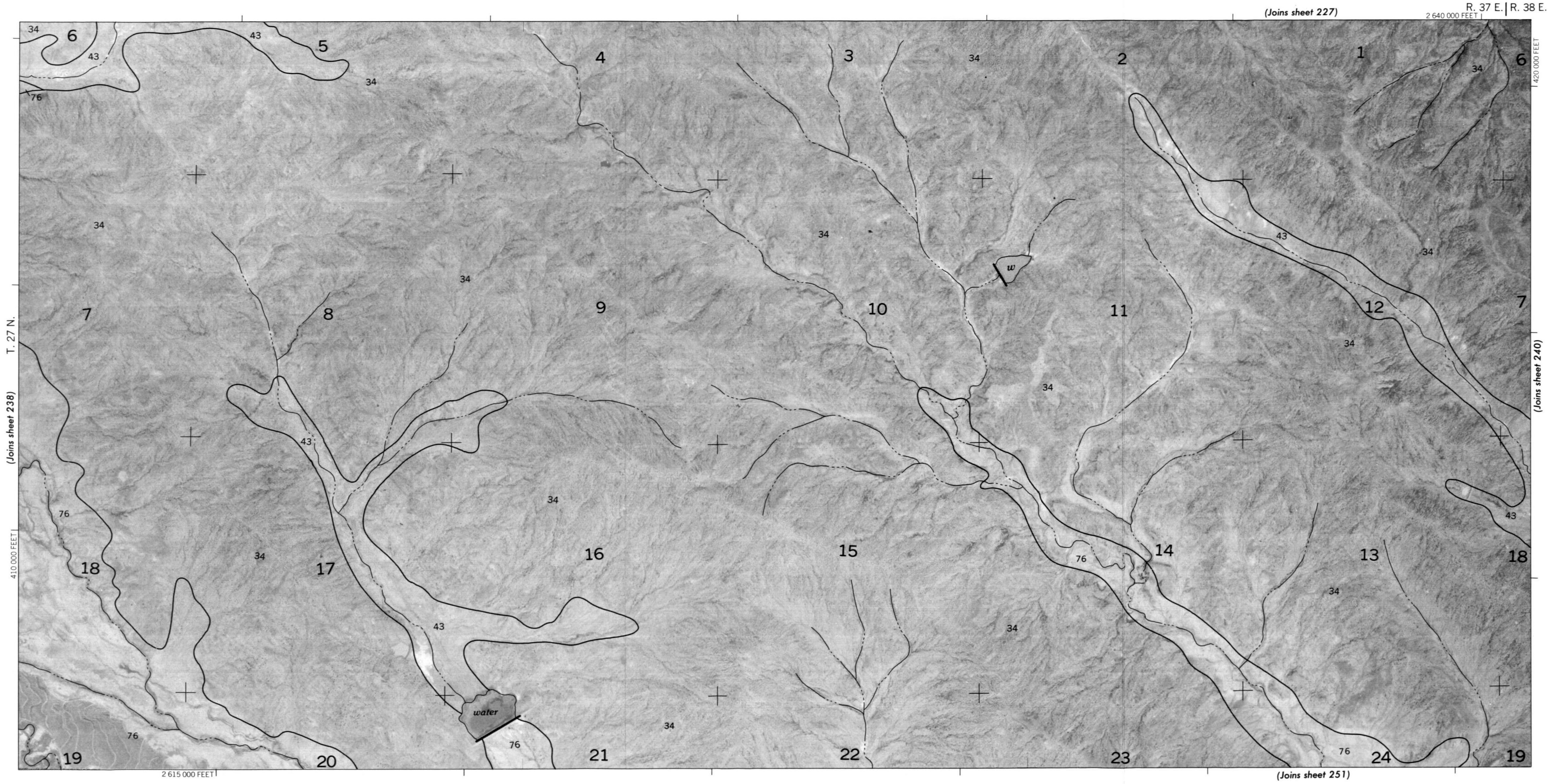
Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of the Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

239

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

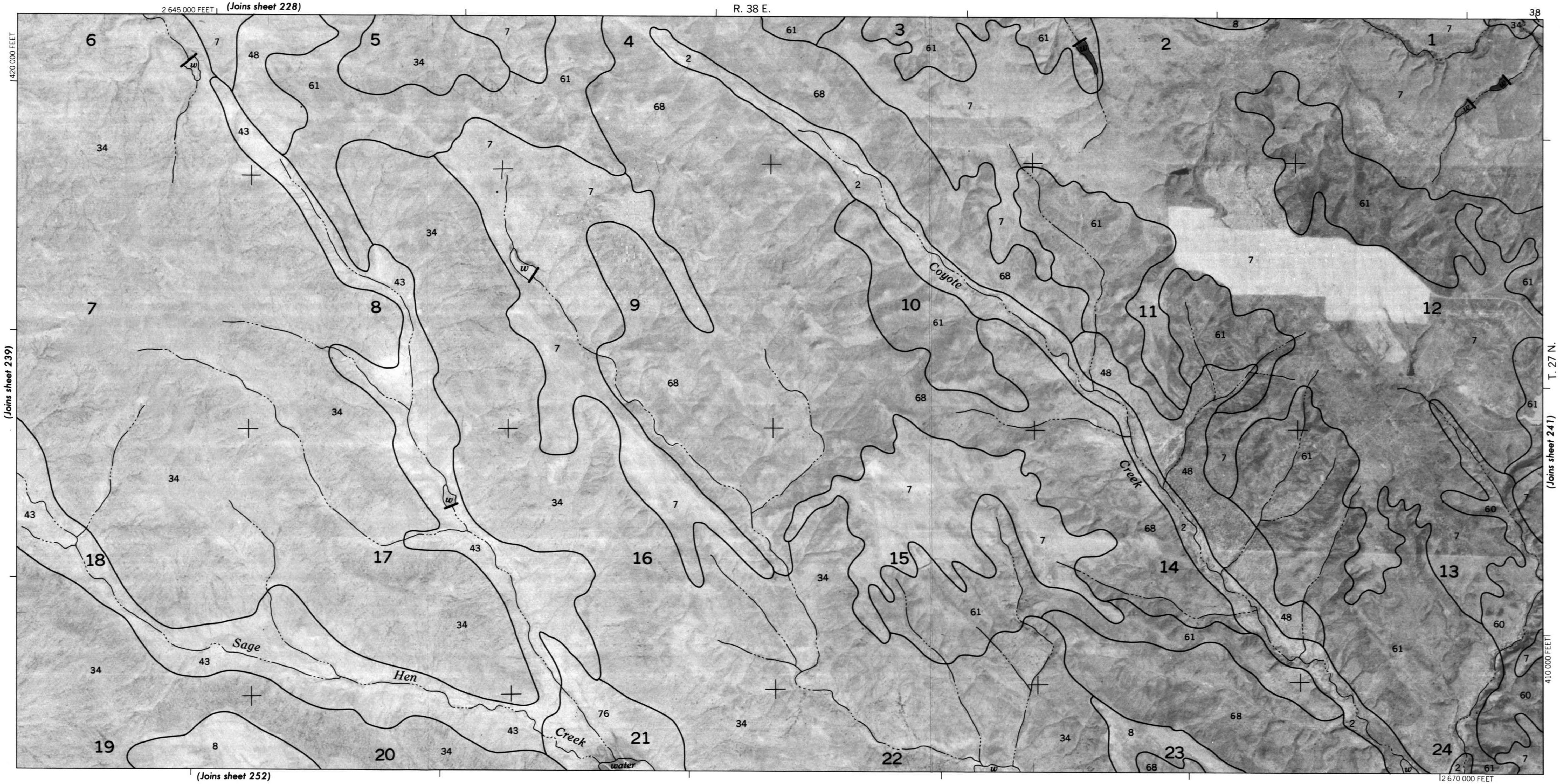
VALLEY COUNTY, MONTANA NO. 239

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 240



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

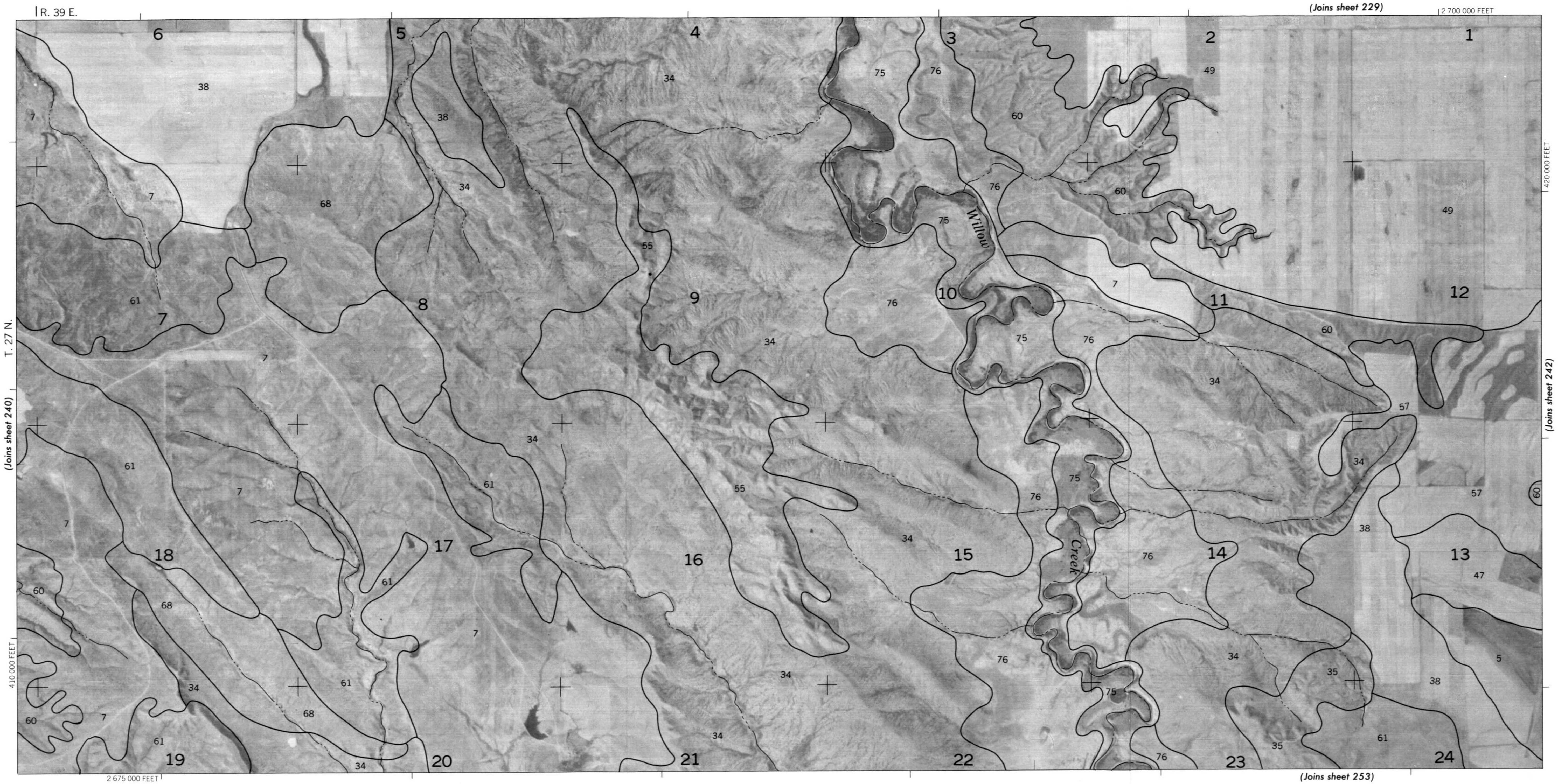
VALLEY COUNTY, MONTANA NO. 240

241

N

VALLEY COUNTY, MONTANA NO. 241

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

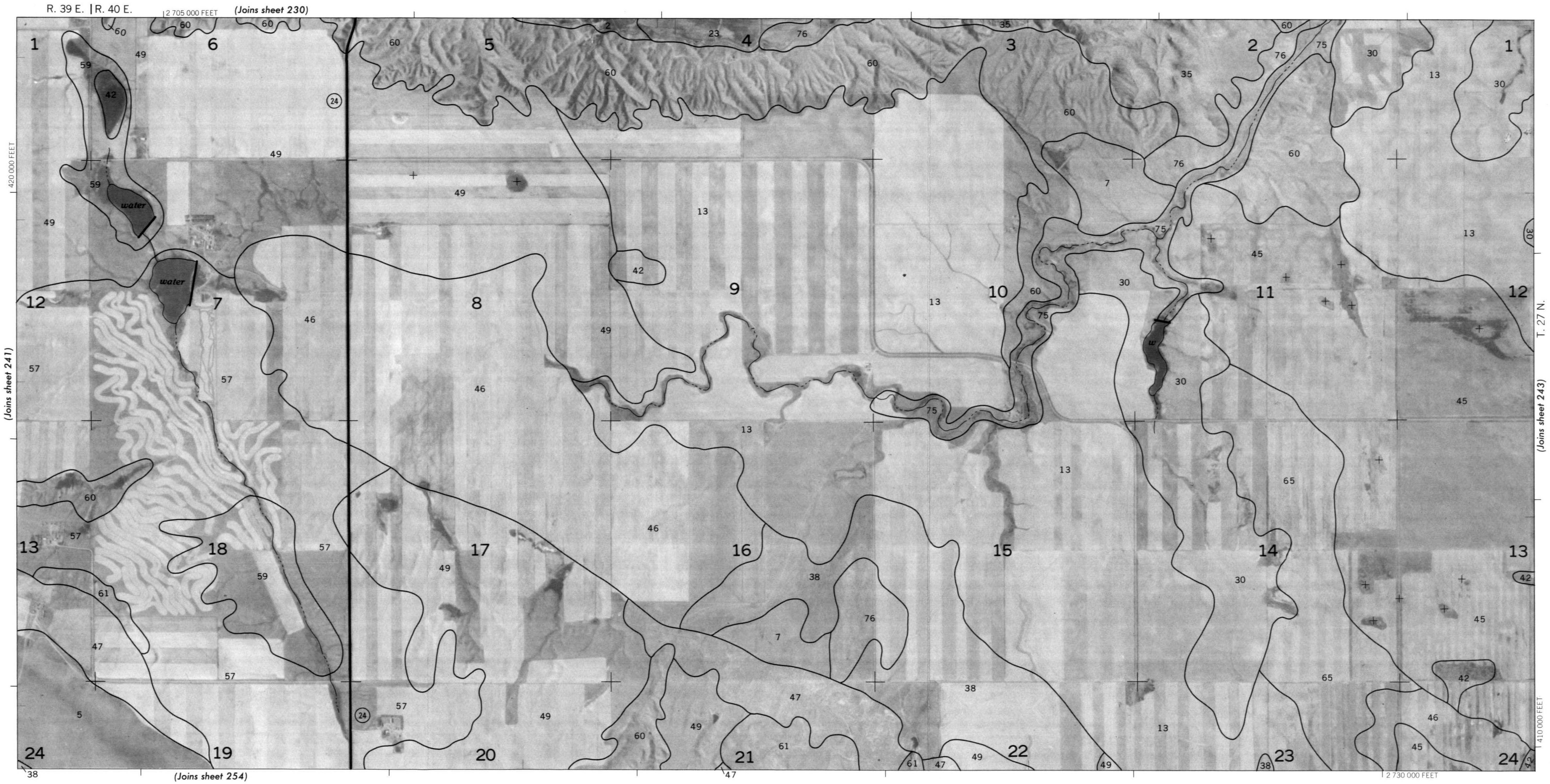


1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

242

VALLEY COUNTY, MONTANA — SHEET NUMBER 242

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 242

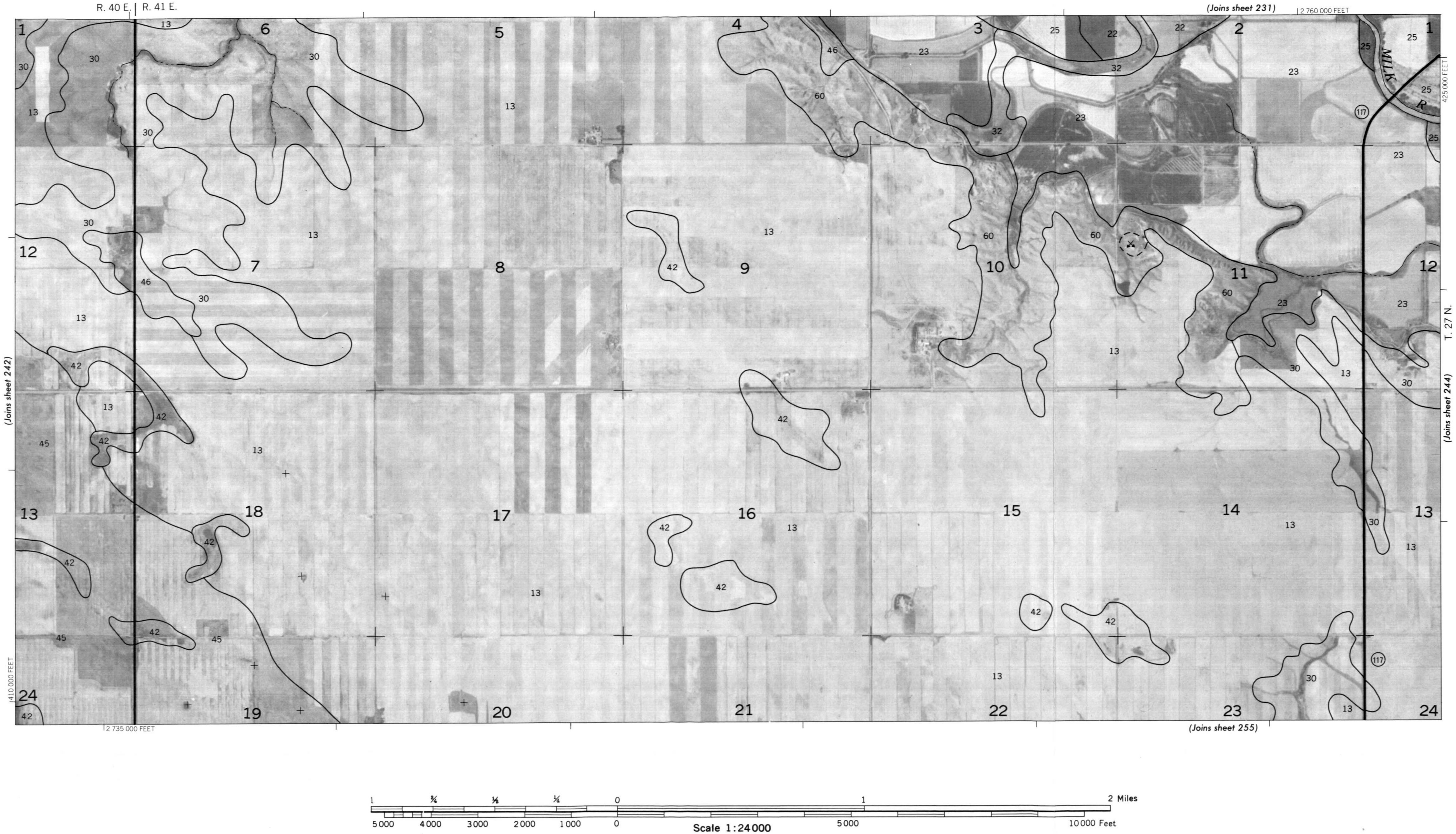
243

N

VALLEY COUNTY, MONTANA NO. 243

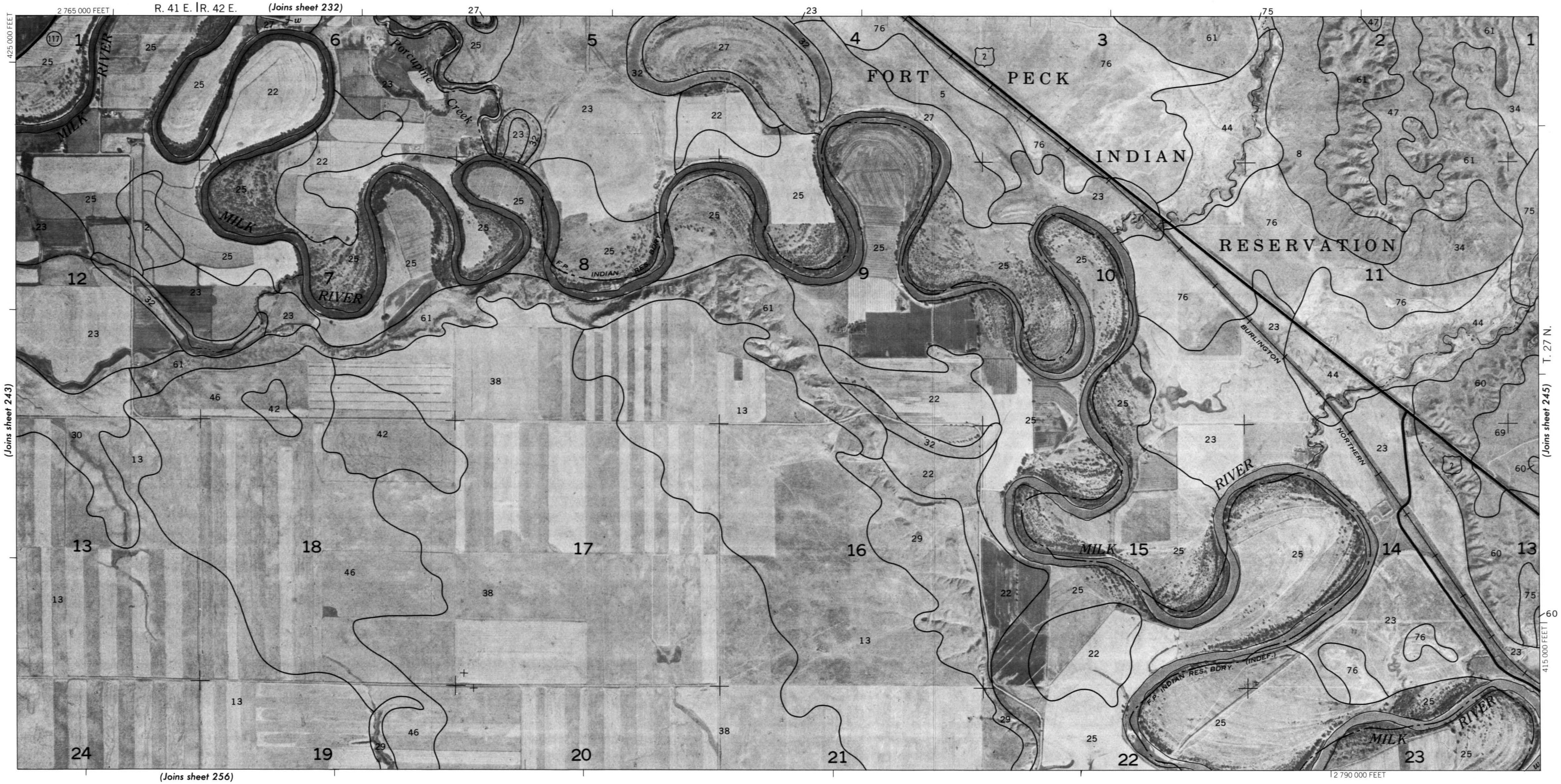
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



N

VALLEY COUNTY, MONTANA — SHEET NUMBER 244



1	¾	½	¼	0			1		2 Miles
5000	4000	3000	2000	1000	0		5000		10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

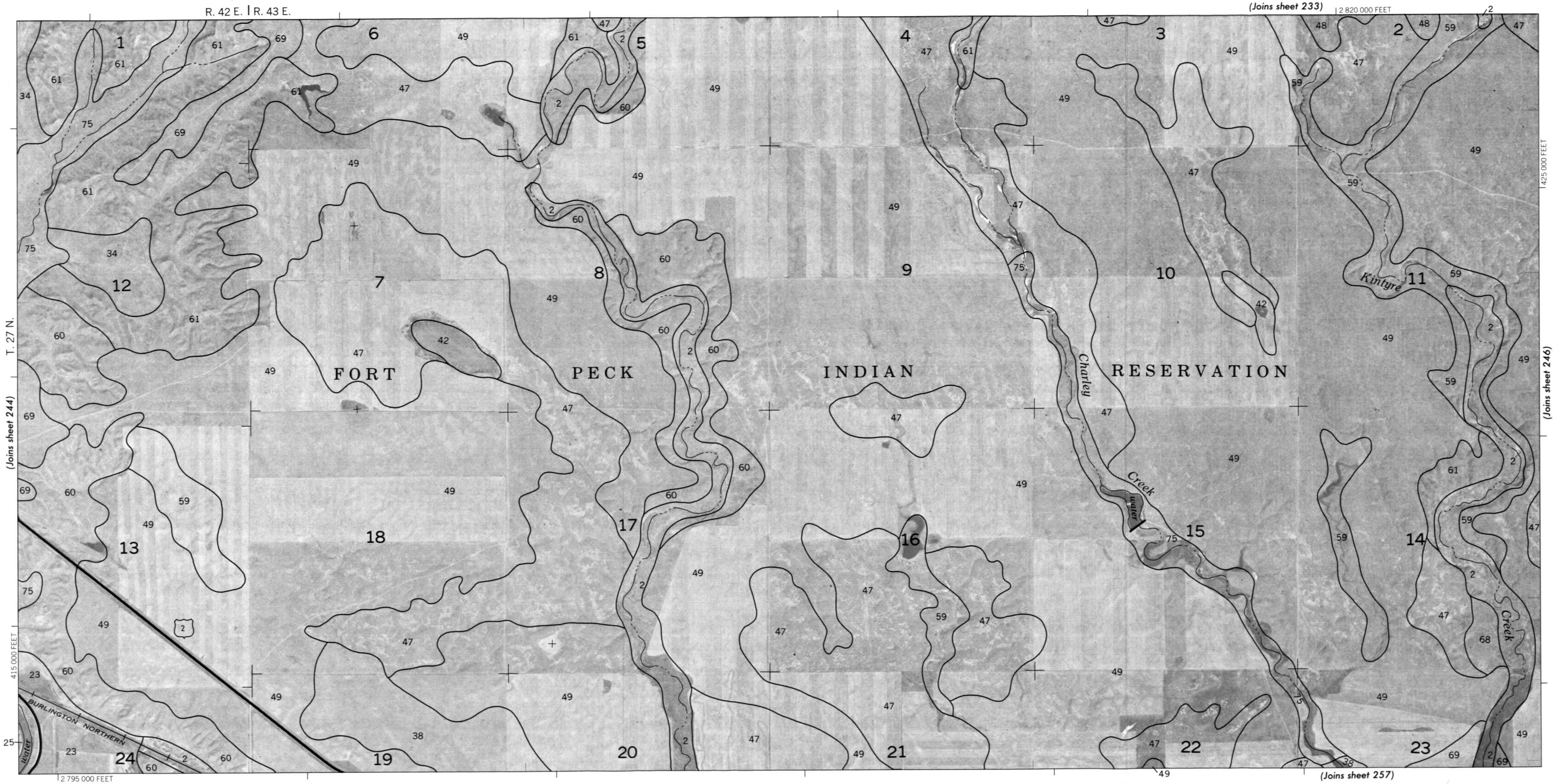
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

245

N

VALLEY COUNTY, MONTANA NO. 245

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



1 ¾ ½ ¼ 0 1 2 Miles

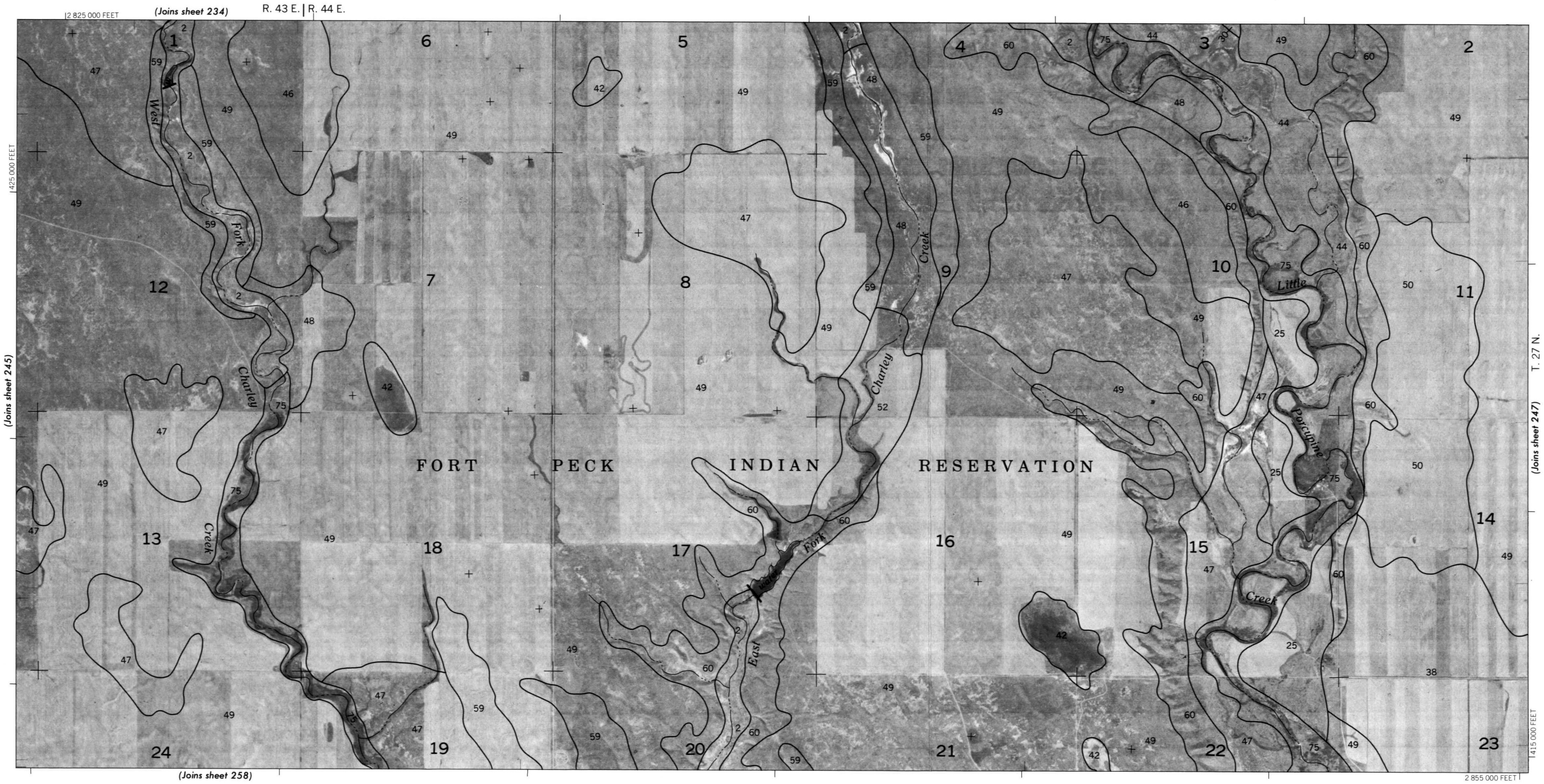
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

(246)

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 246



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5 000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

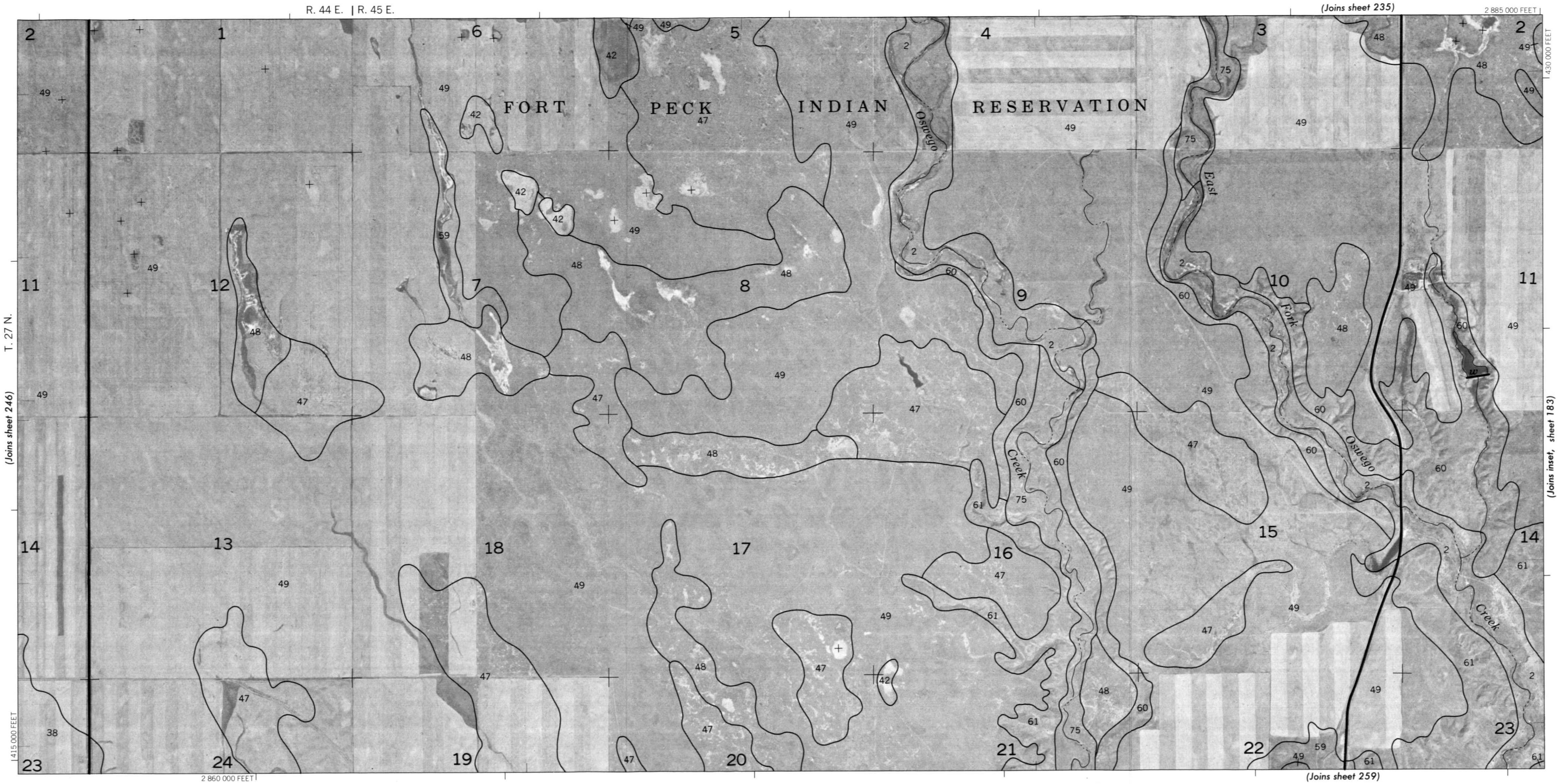
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 246

N

VALLEY COUNTY, MONTANA NO. 247

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

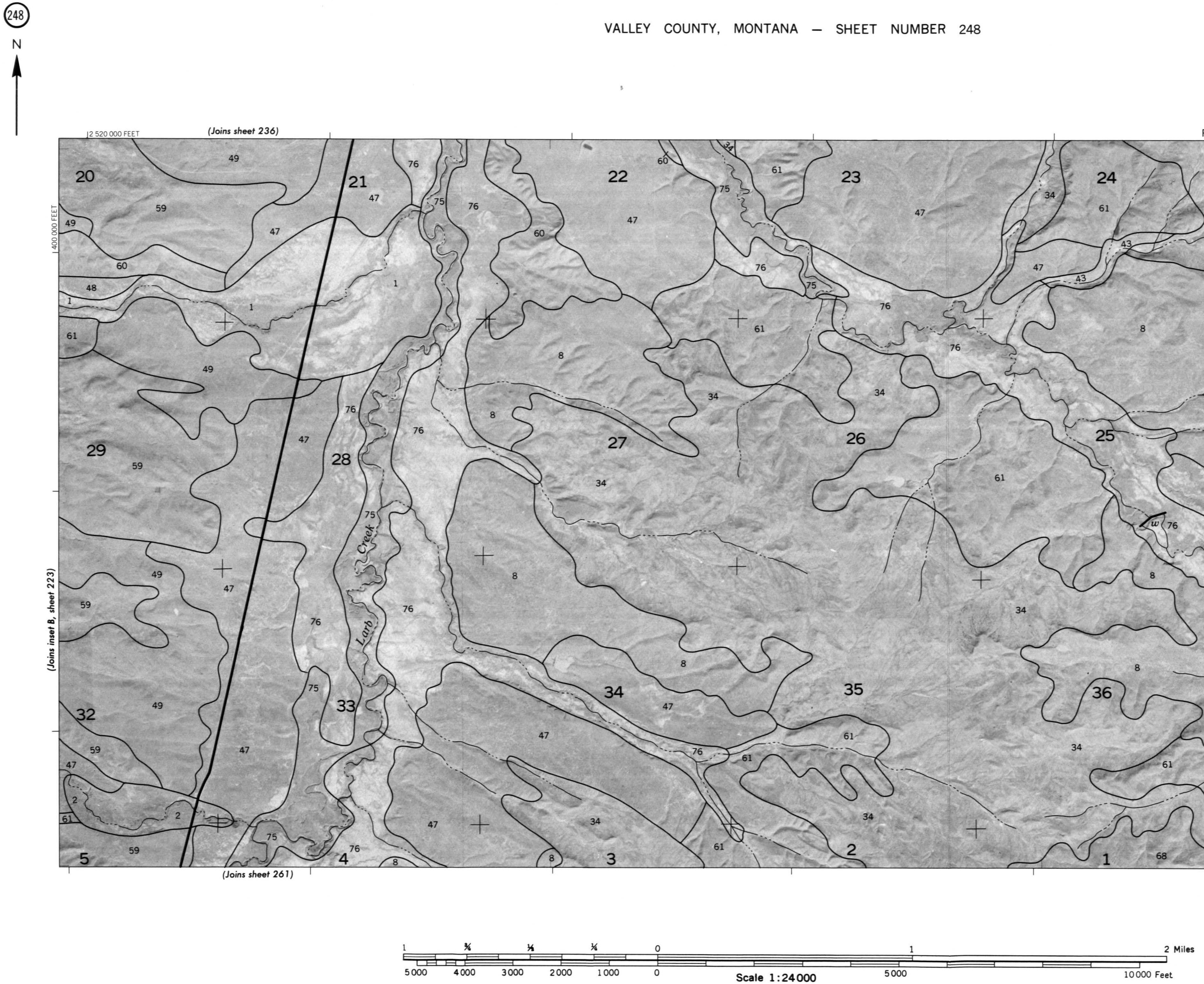


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 248



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 248

249

N

VALLEY COUNTY, MONTANA NO. 249

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

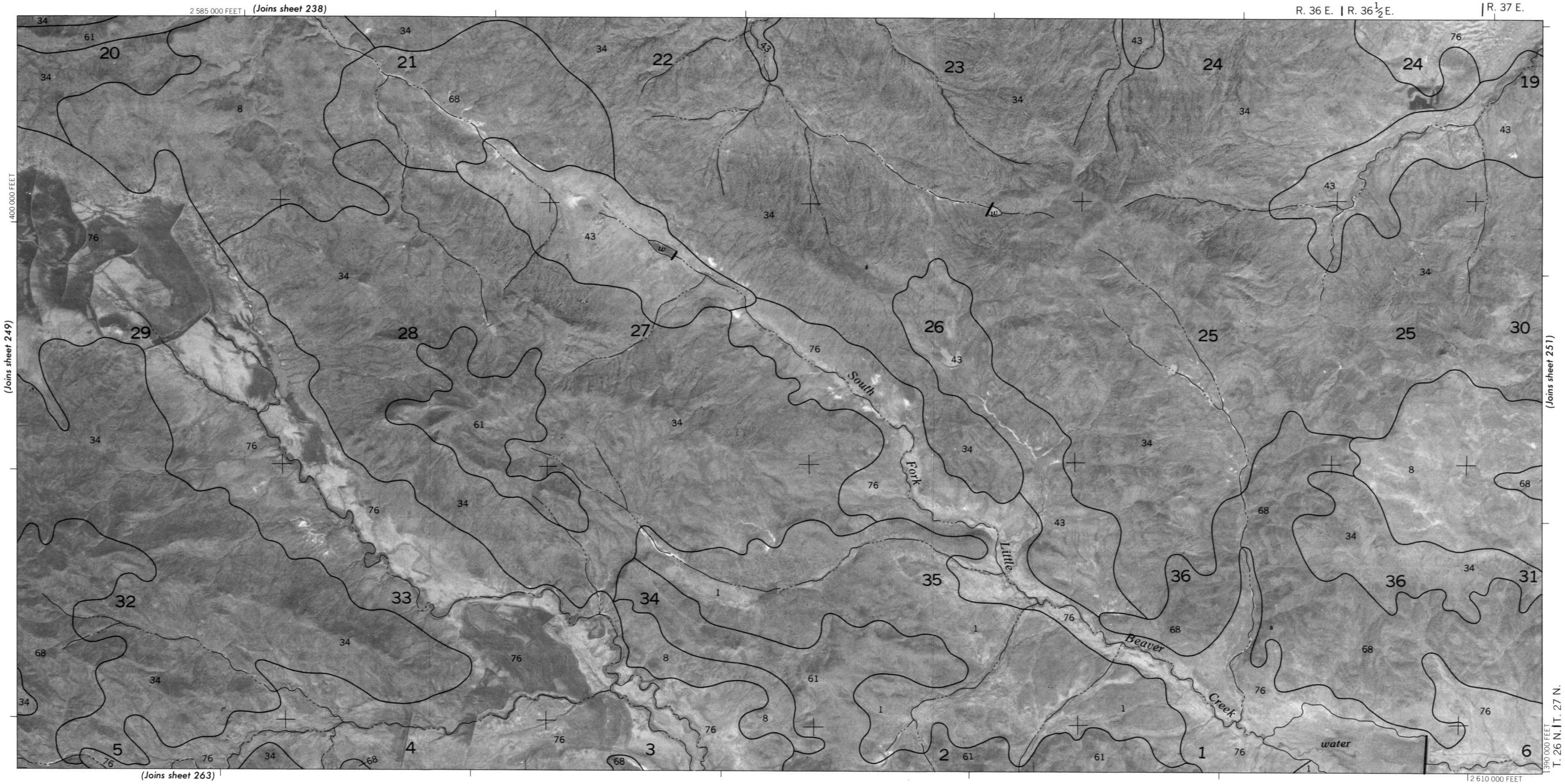
5000 4000 3000 2000 1000 0 5000 10000 Feet

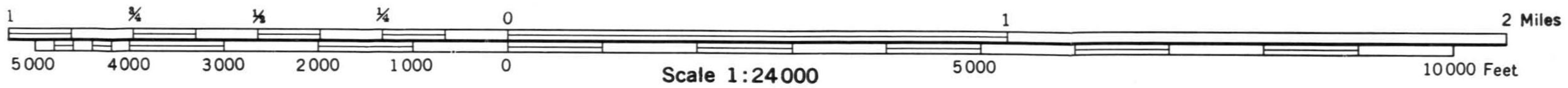
Scale 1:24000

250

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 250





Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

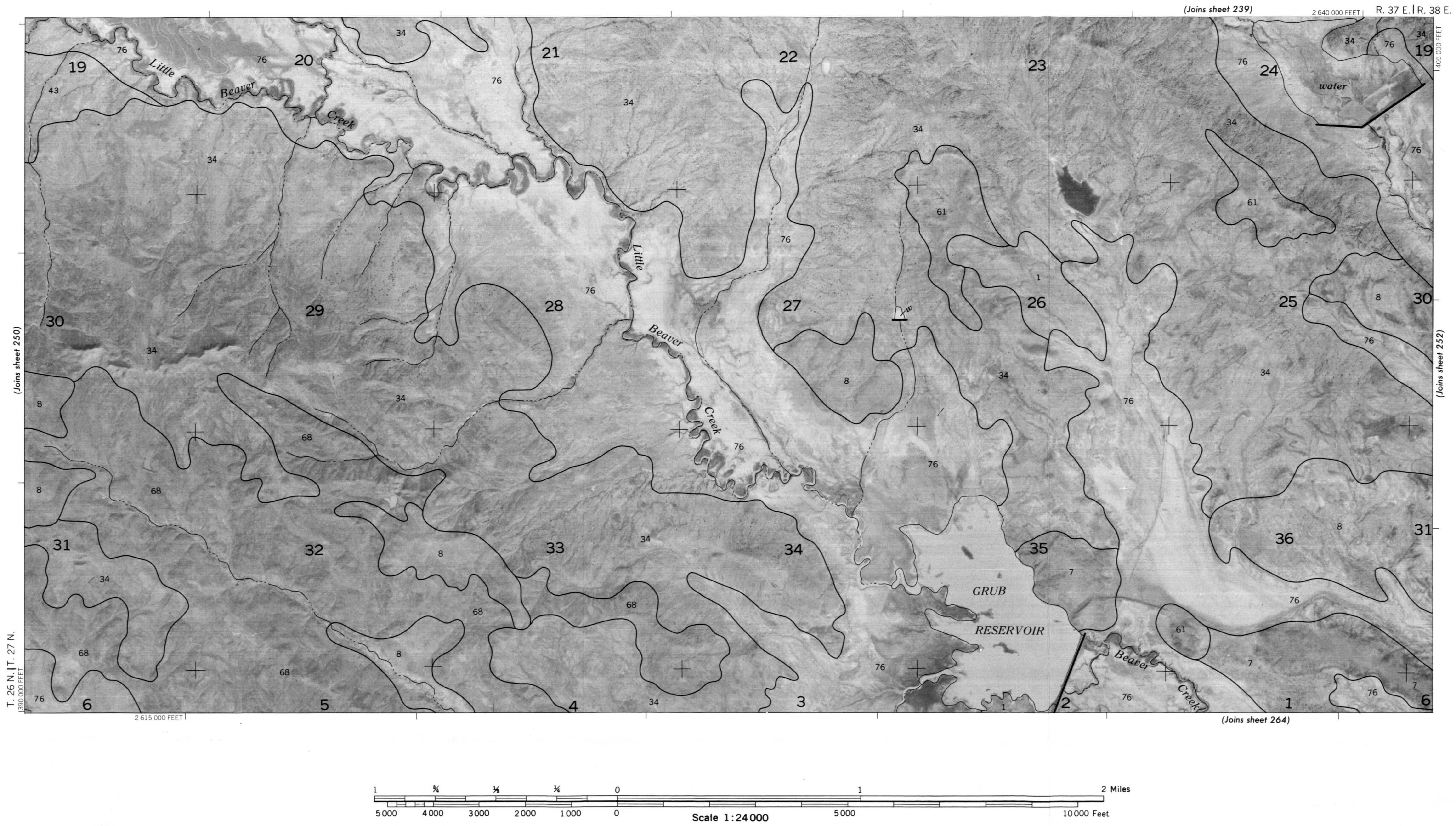
VALLEY COUNTY, MONTANA NO. 250

251

N

VALLEY COUNTY, MONTANA NO. 251

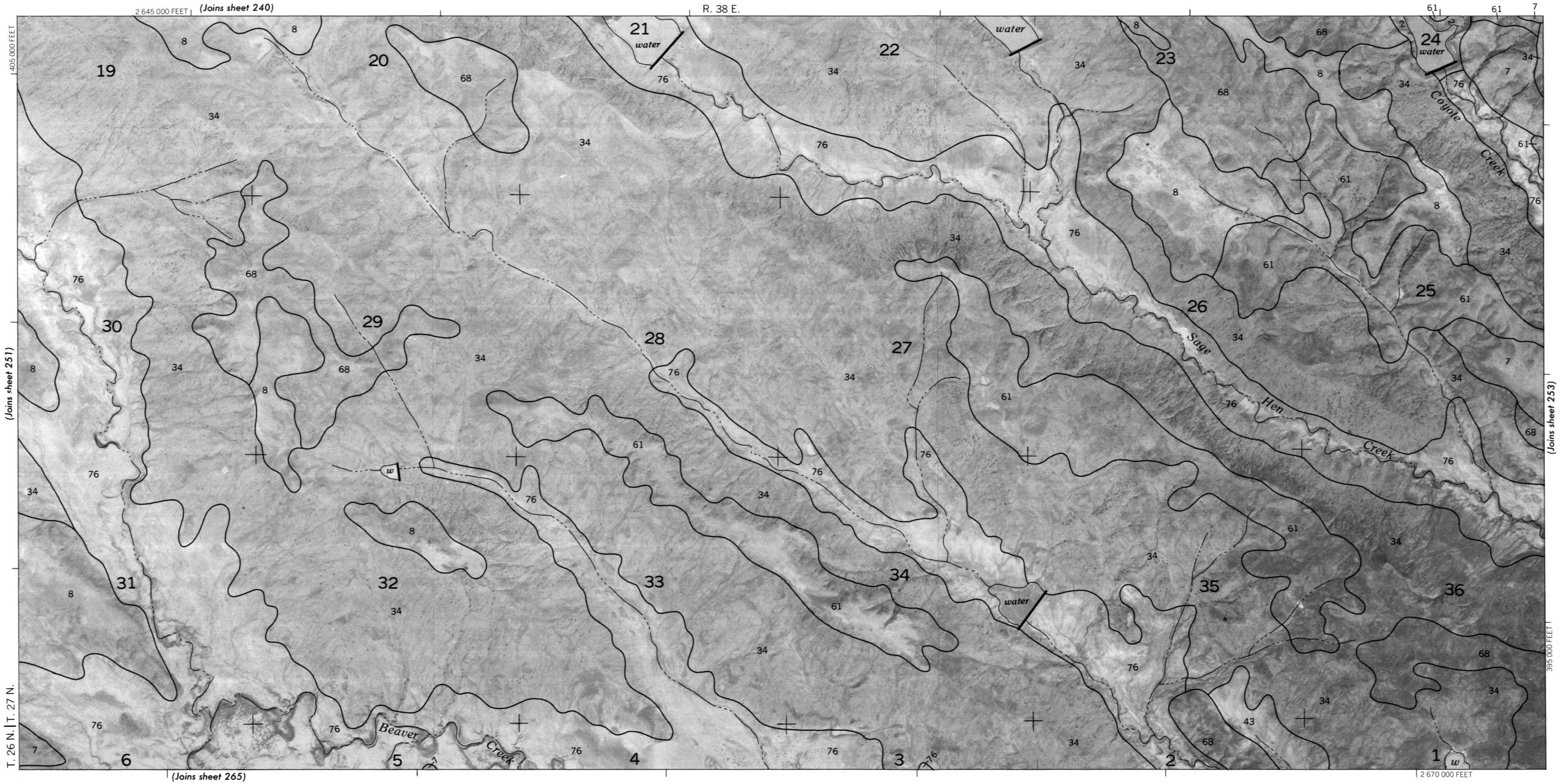
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



252

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 252



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

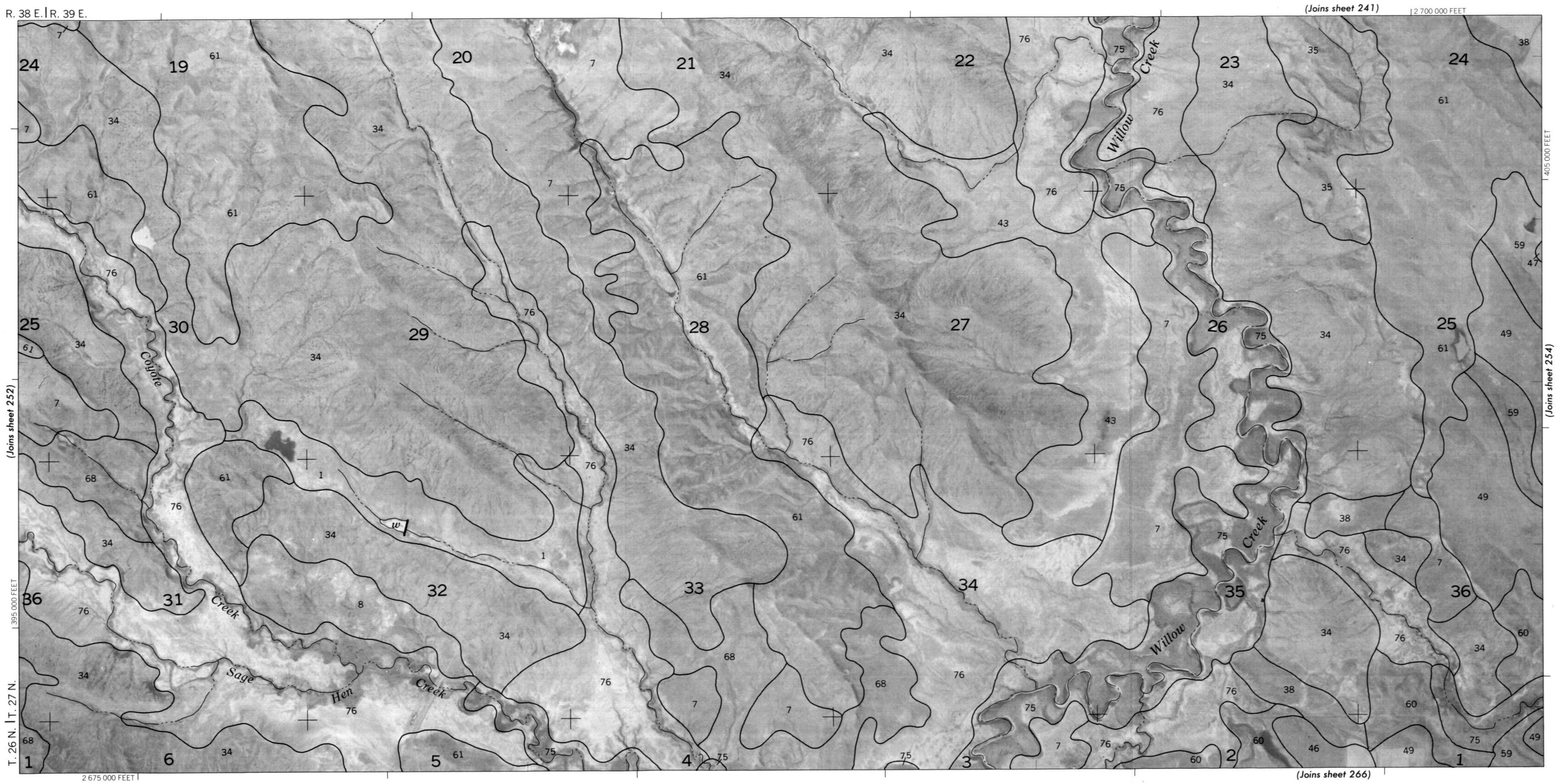
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 252

253

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

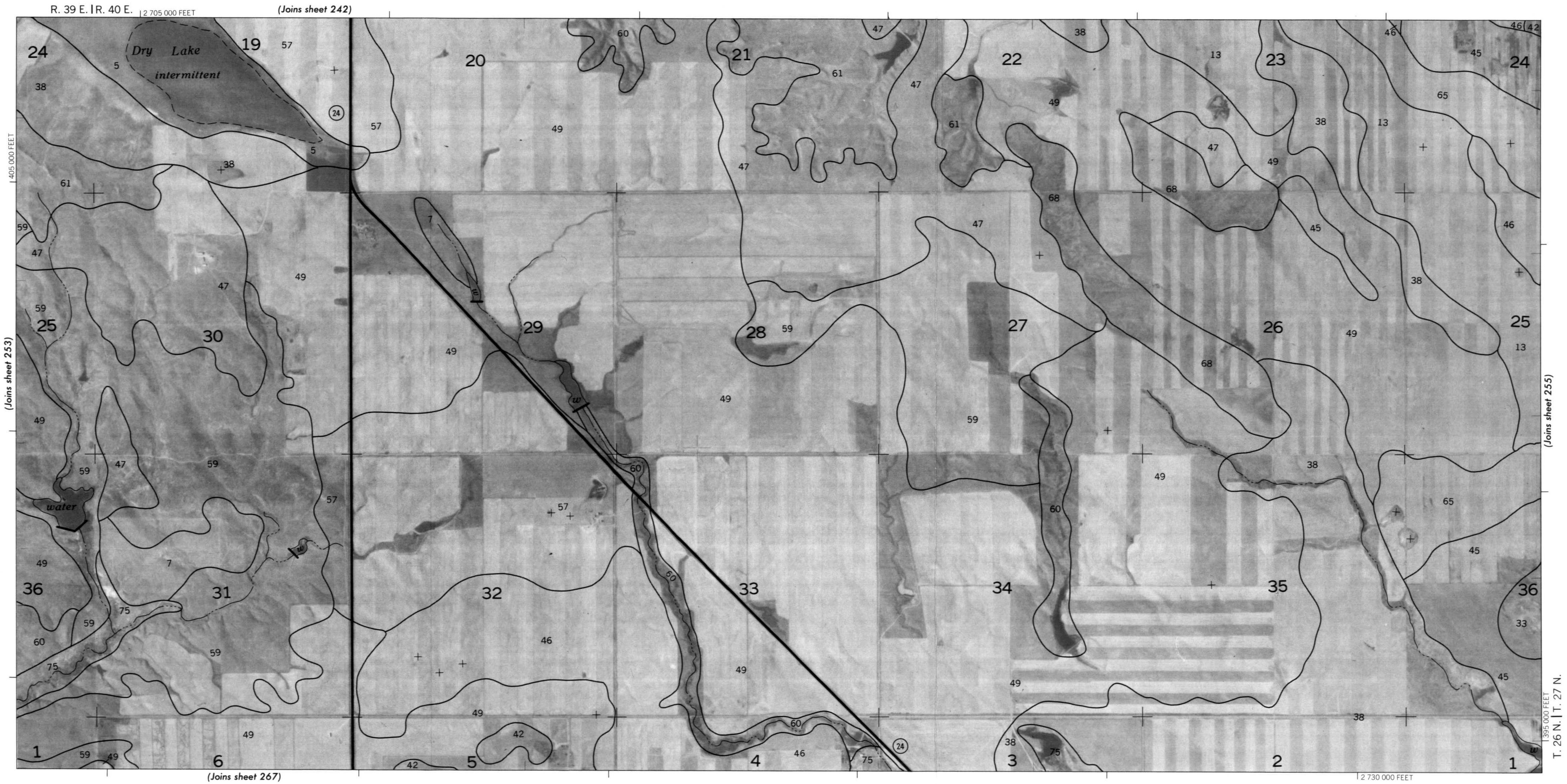
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 253

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 254



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24 000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 256

1 ⅞ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

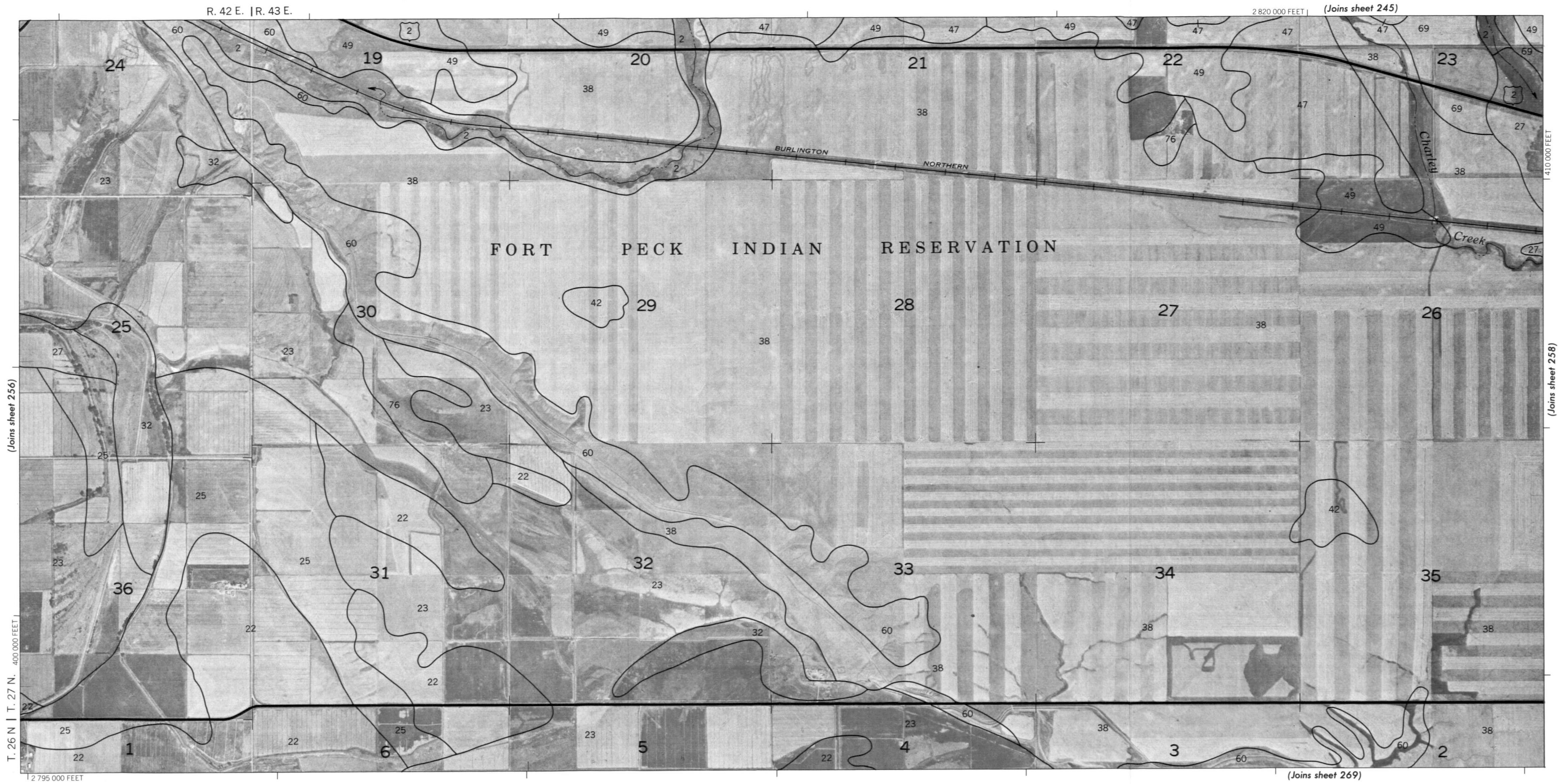
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA — SHEET NUMBER 257

257

N



1 ¾ ½ ¼ 0 1 2 Miles

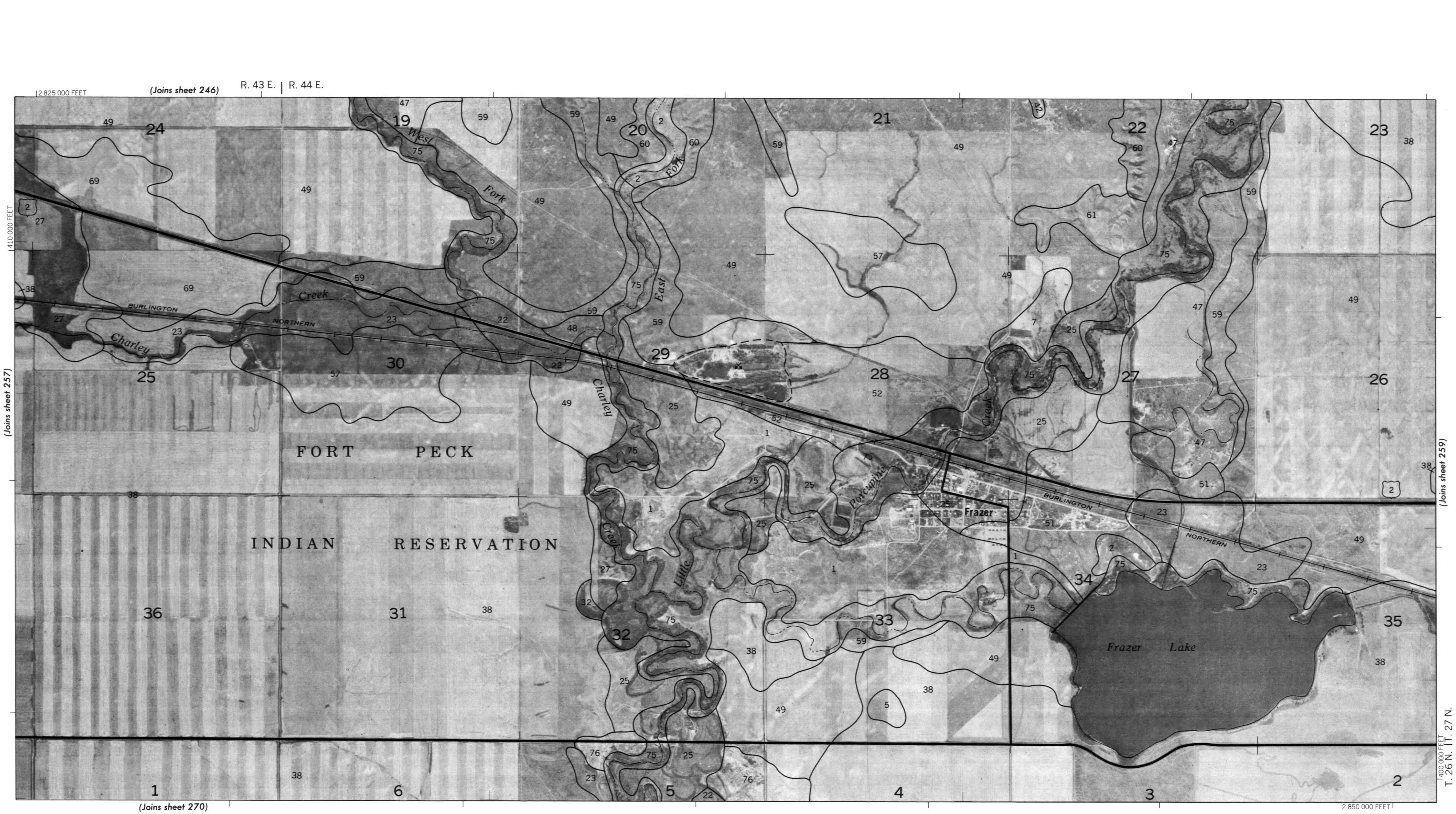
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 257

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 258



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

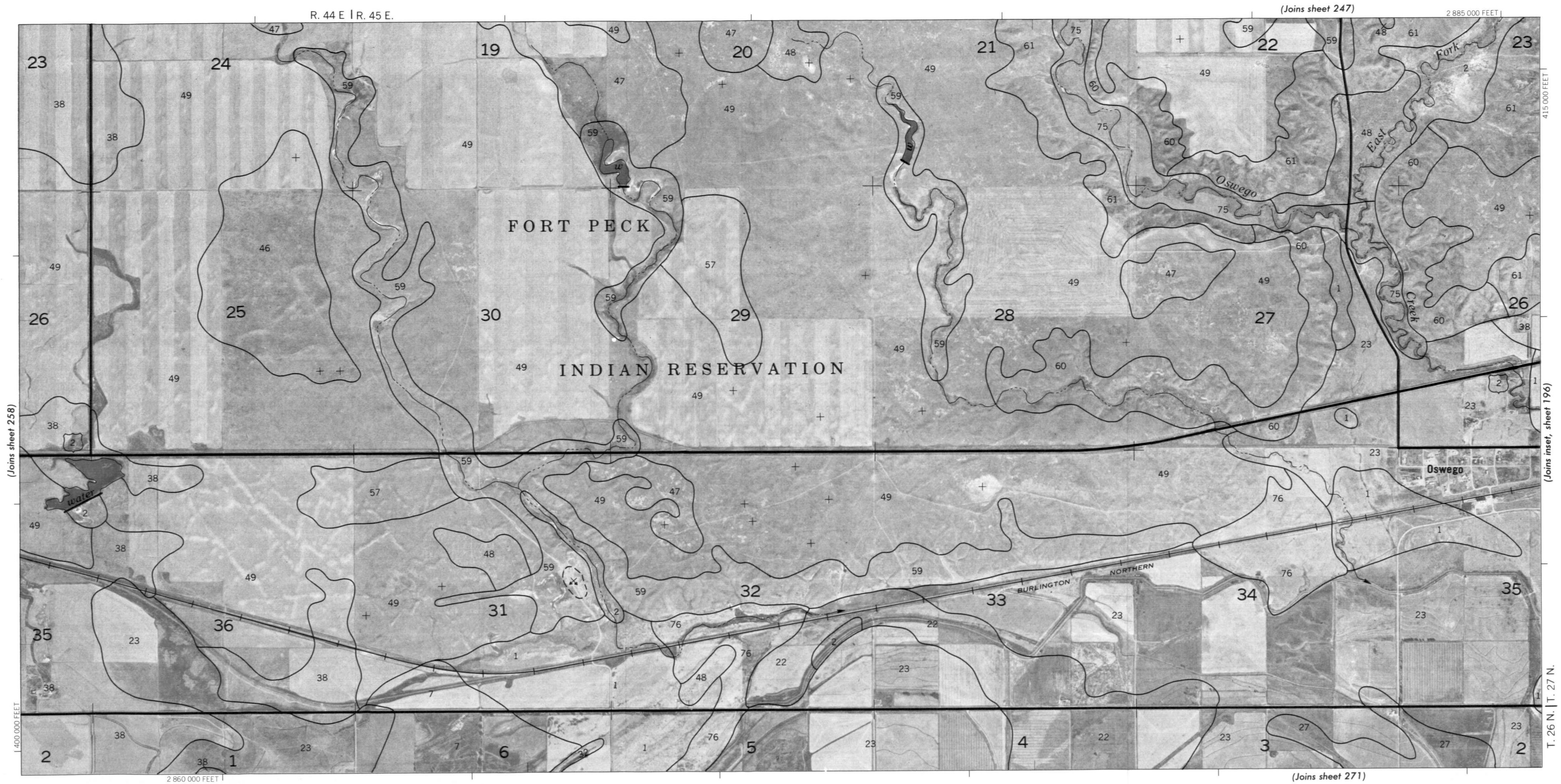
Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

259

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

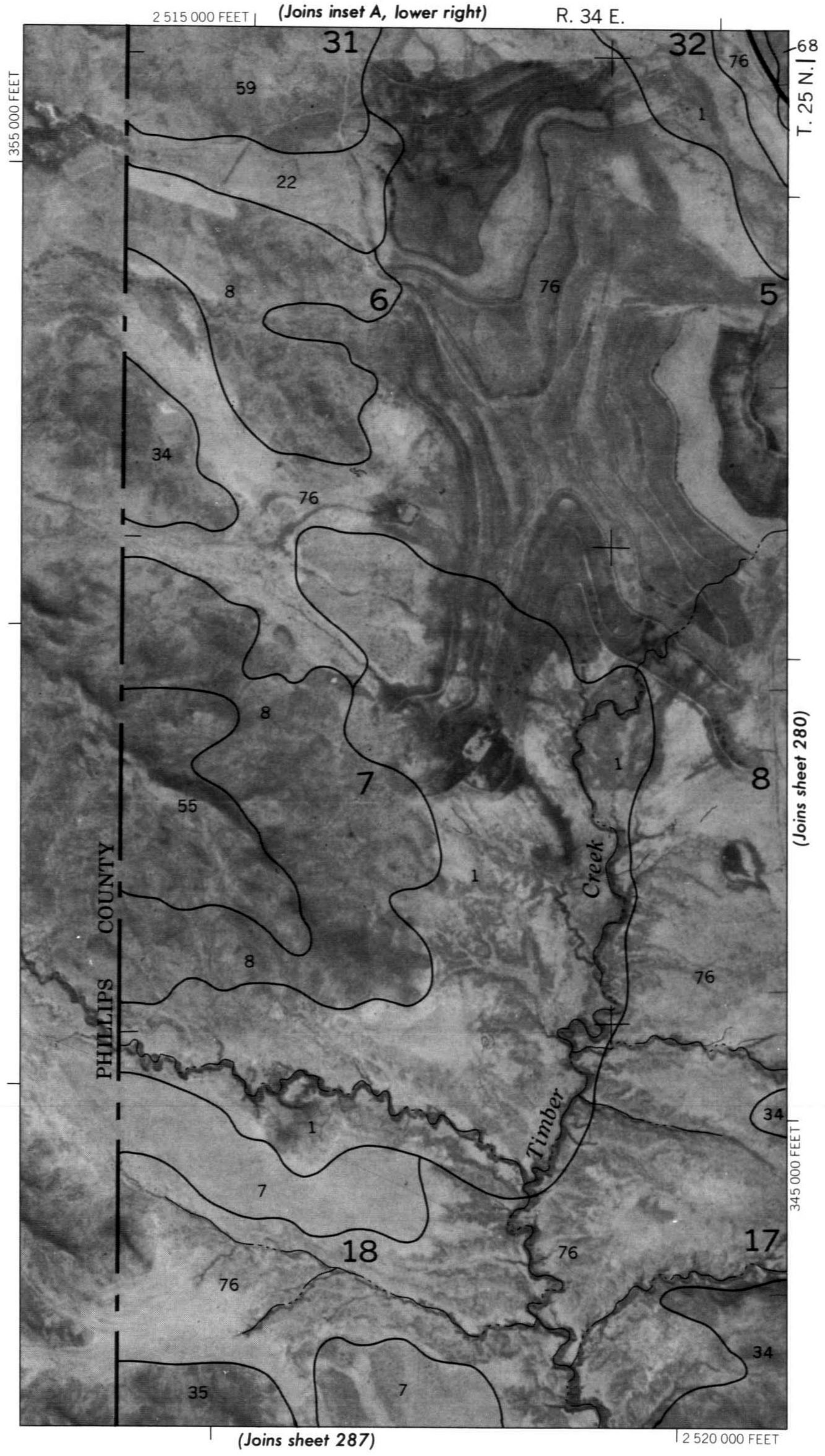
VALLEY COUNTY, MONTANA NO. 259

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

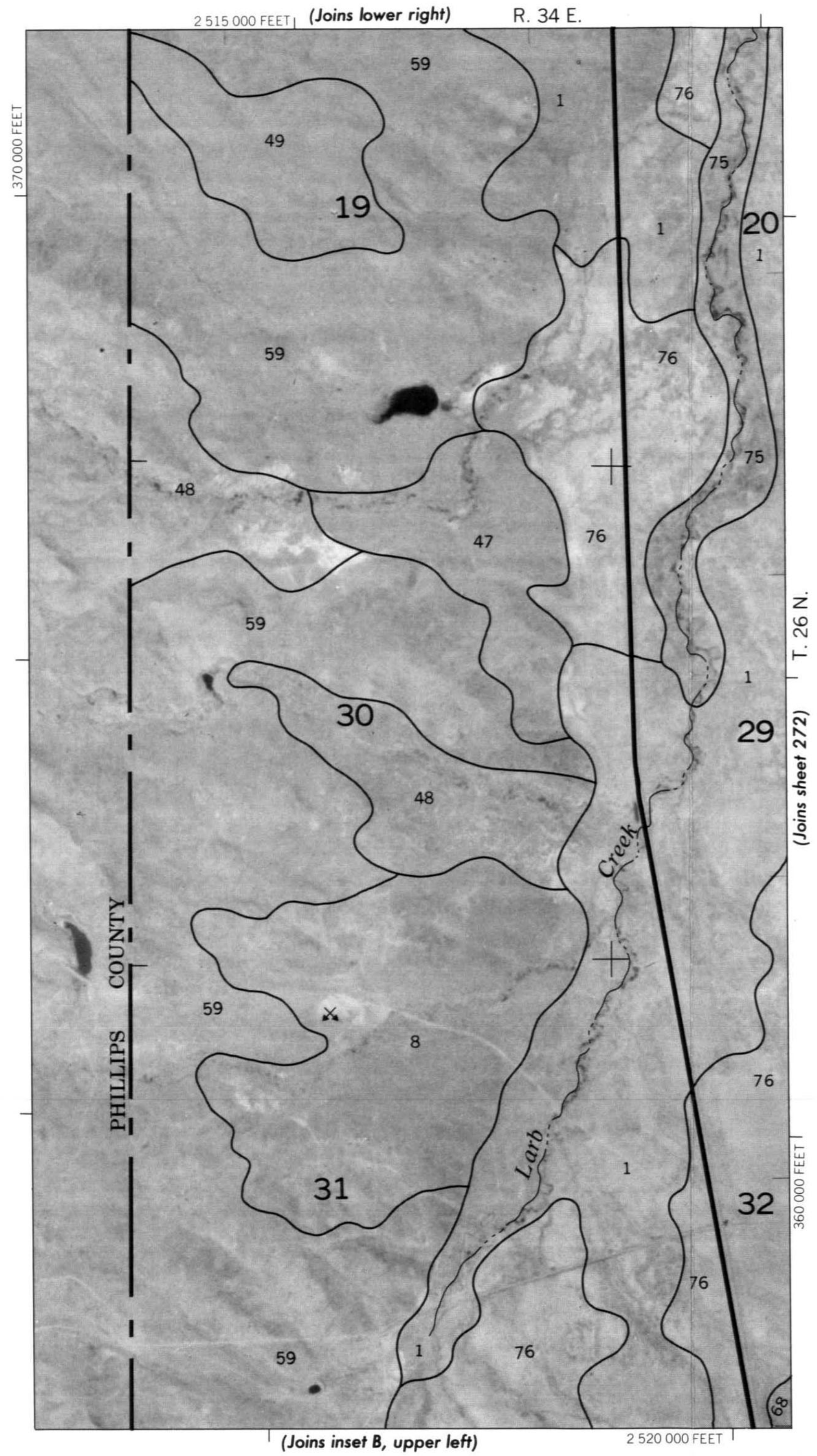
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

N

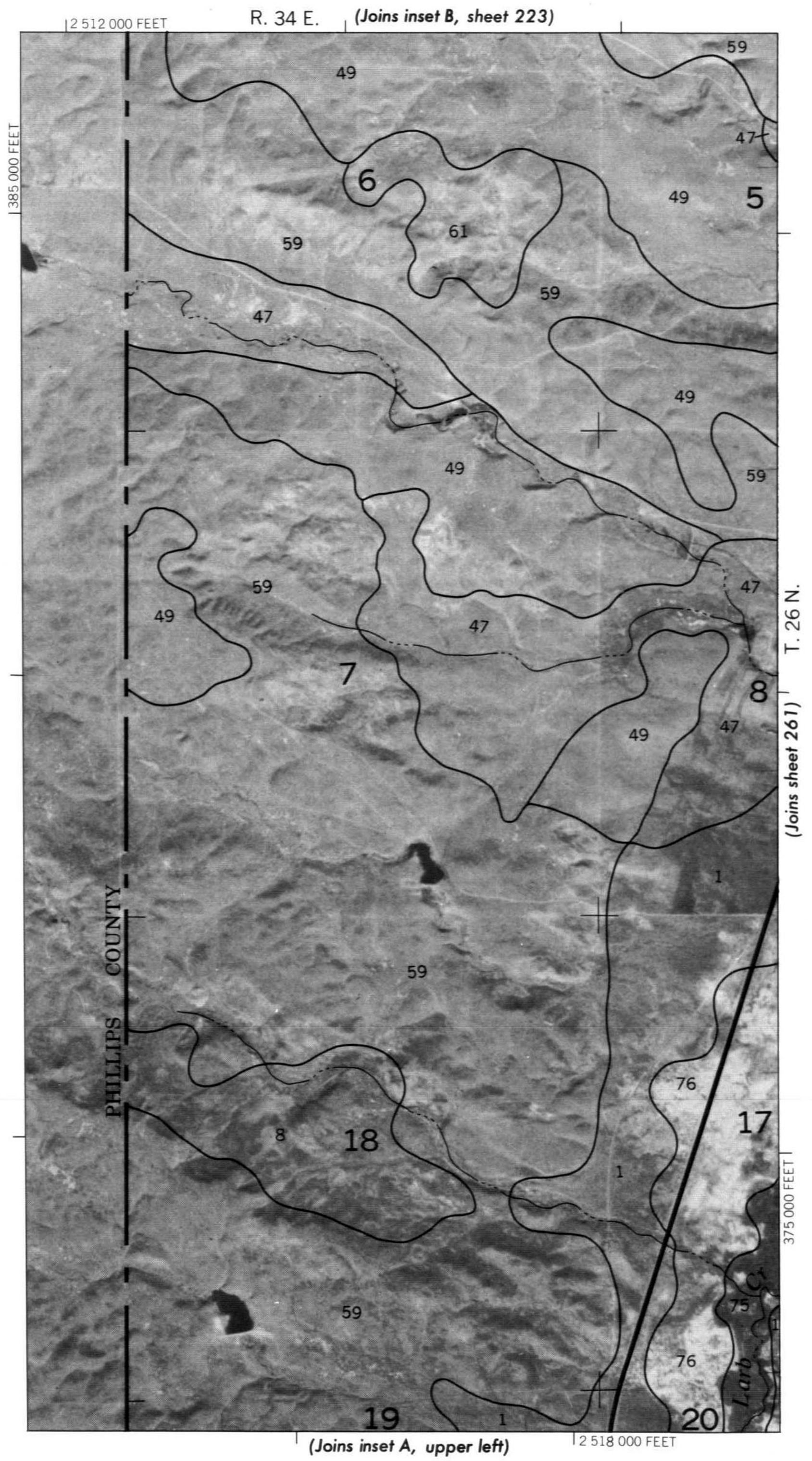
VALLEY COUNTY, MONTANA — SHEET NUMBER 260



INSET B



INSET A



3000 AND 5000-FOOT GRID TICKS

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

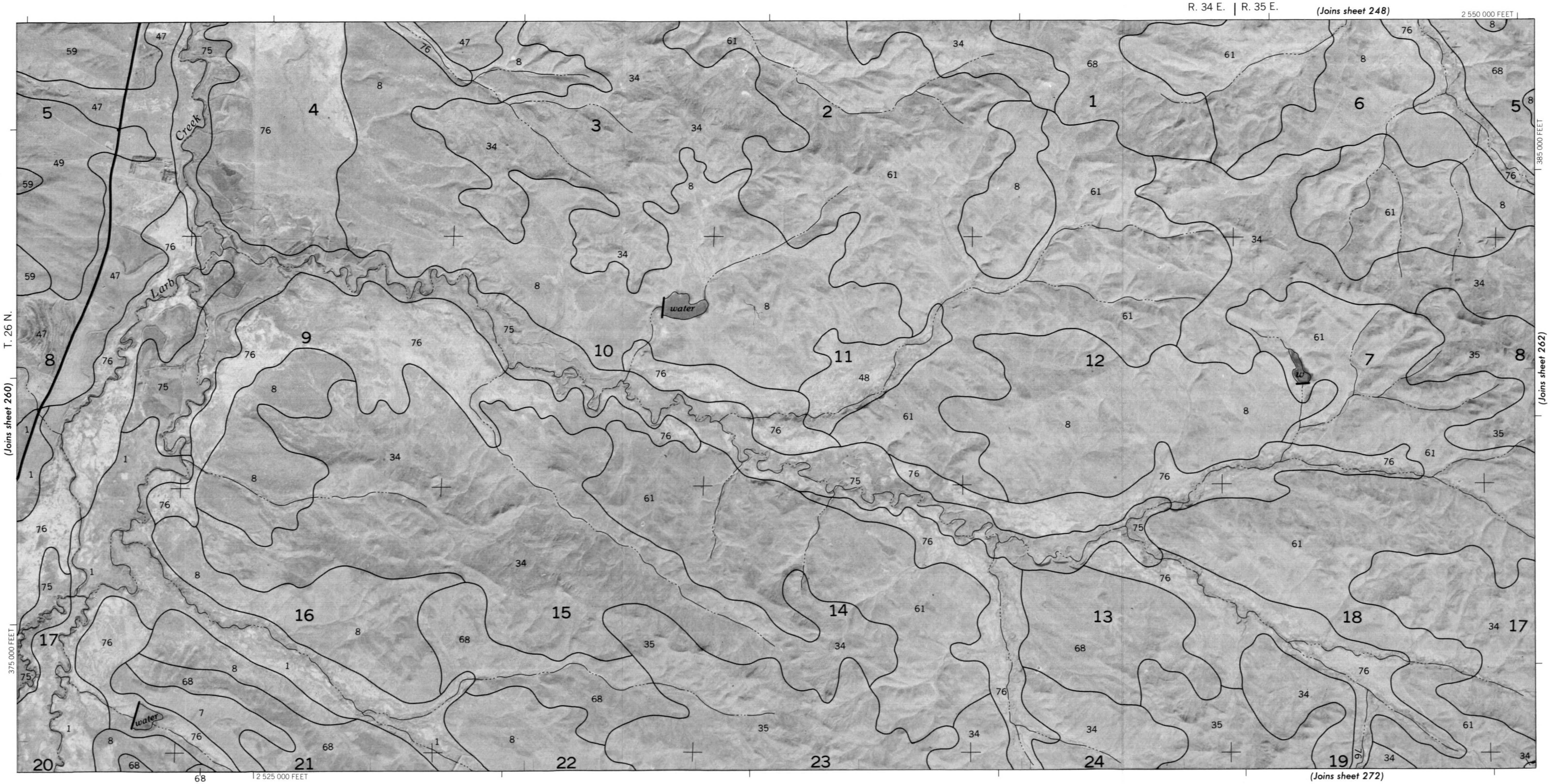
VALLEY COUNTY, MONTANA — SHEET NUMBER 261

N

VALLEY COUNTY, MONTANA NO. 261

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

262

VALLEY COUNTY, MONTANA — SHEET NUMBER 262

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

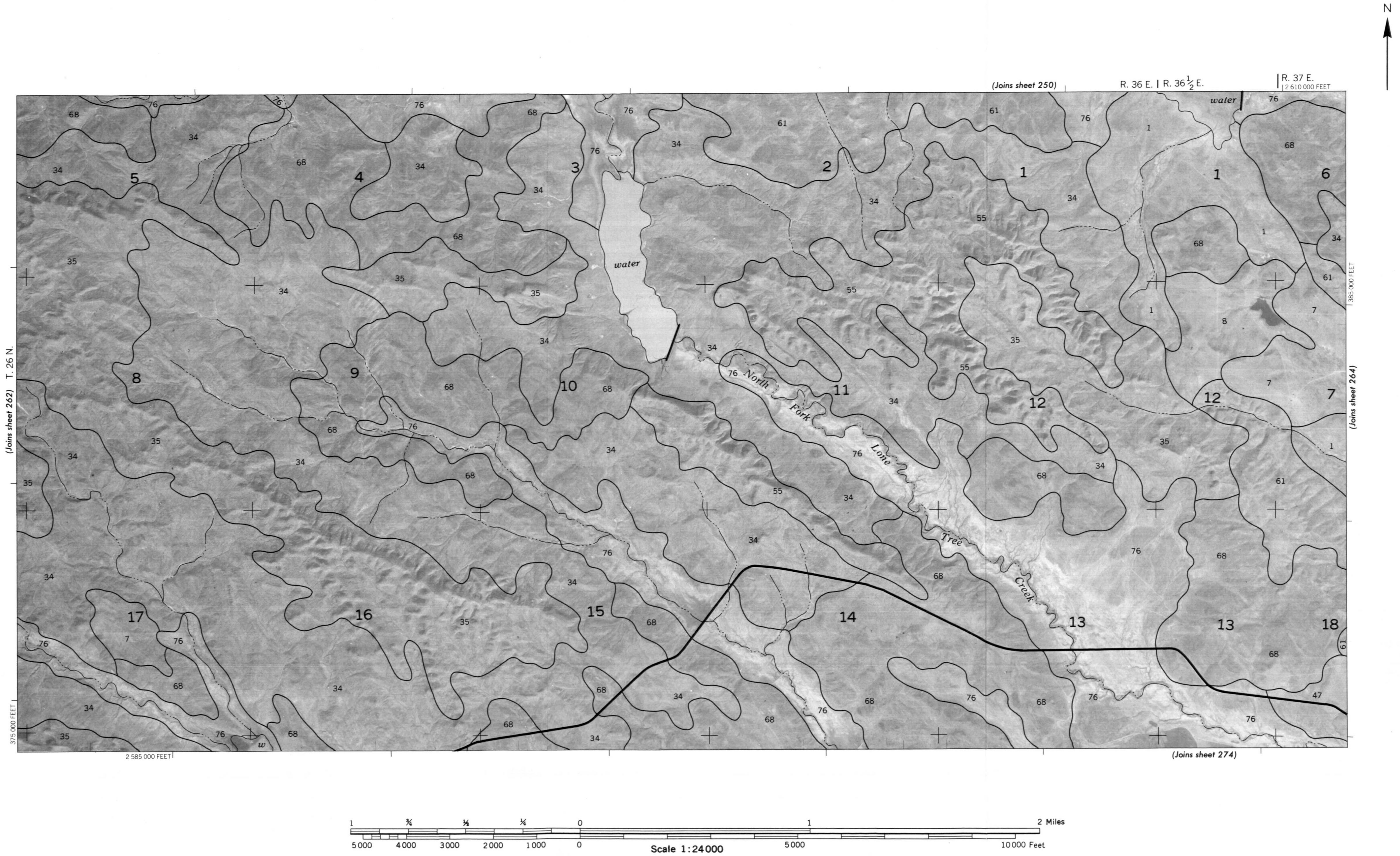
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 262

VALLEY COUNTY, MONTANA NO. 263

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

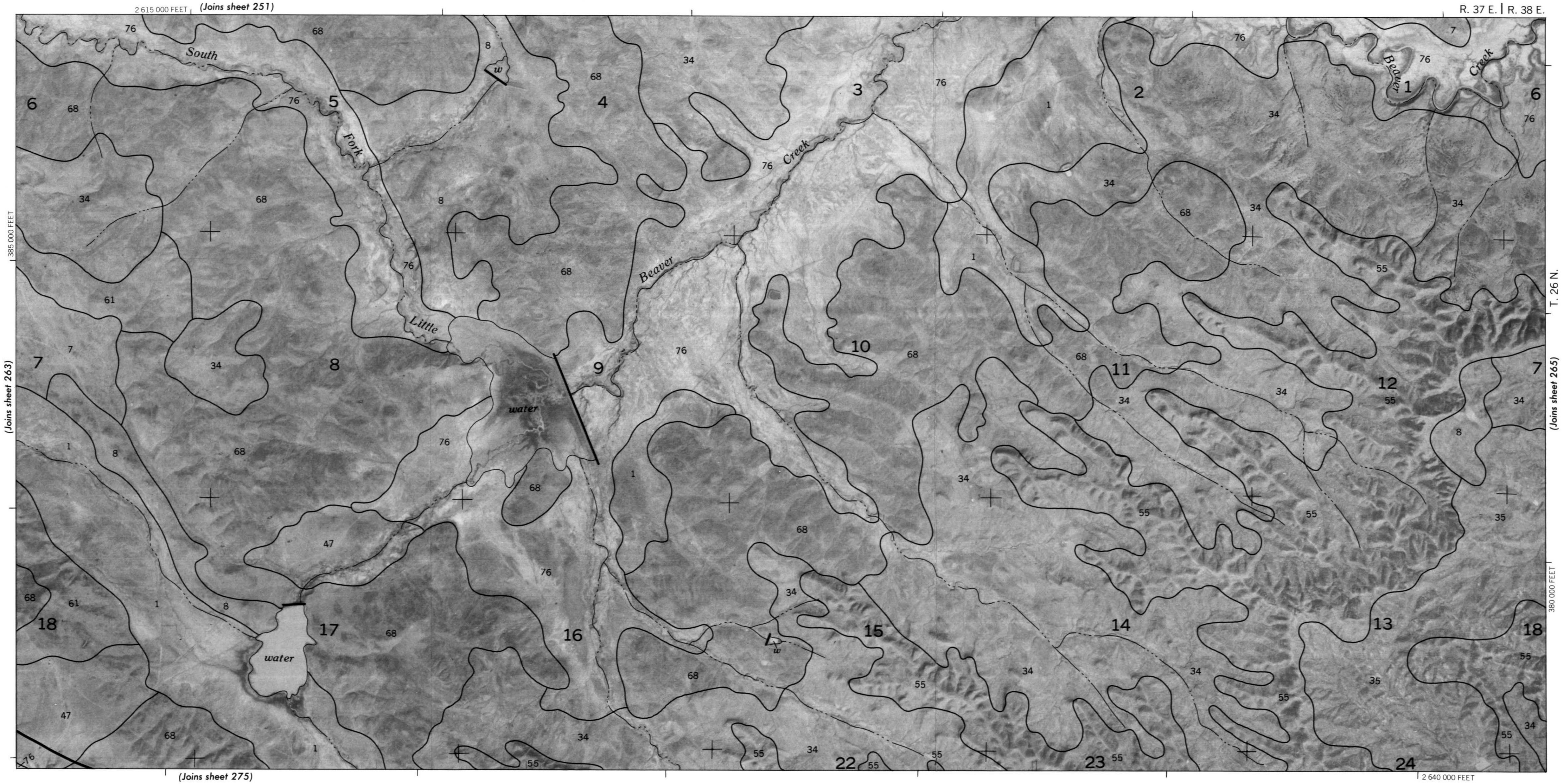
5 000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



264

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 264



1 ⅜ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

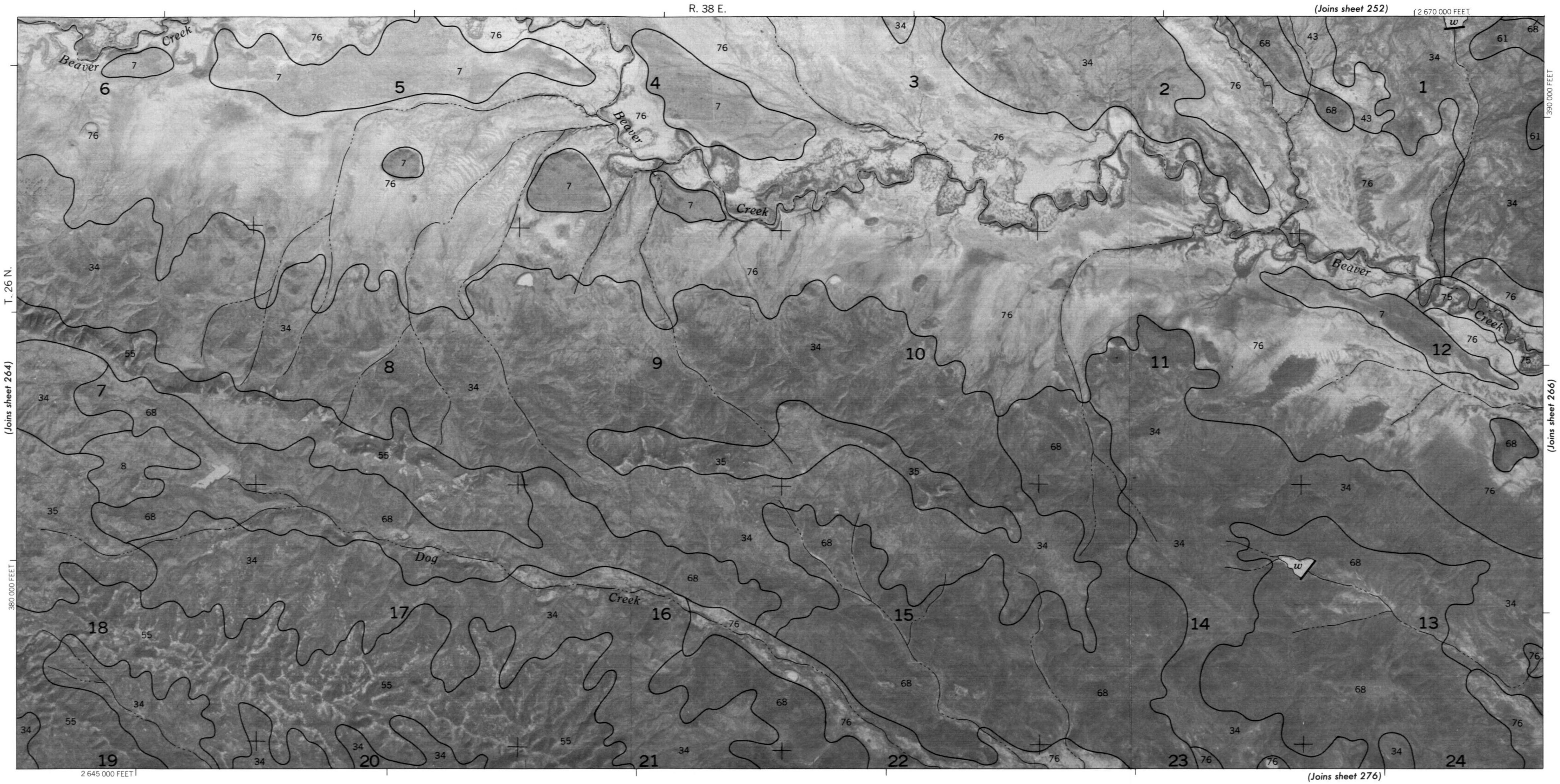
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 264

VALLEY COUNTY, MONTANA — SHEET NUMBER 265

N



Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

VALLEY COUNTY, MONTANA NO. 265

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 266

1 ¾ ½ ¼ 0 1 2 Miles

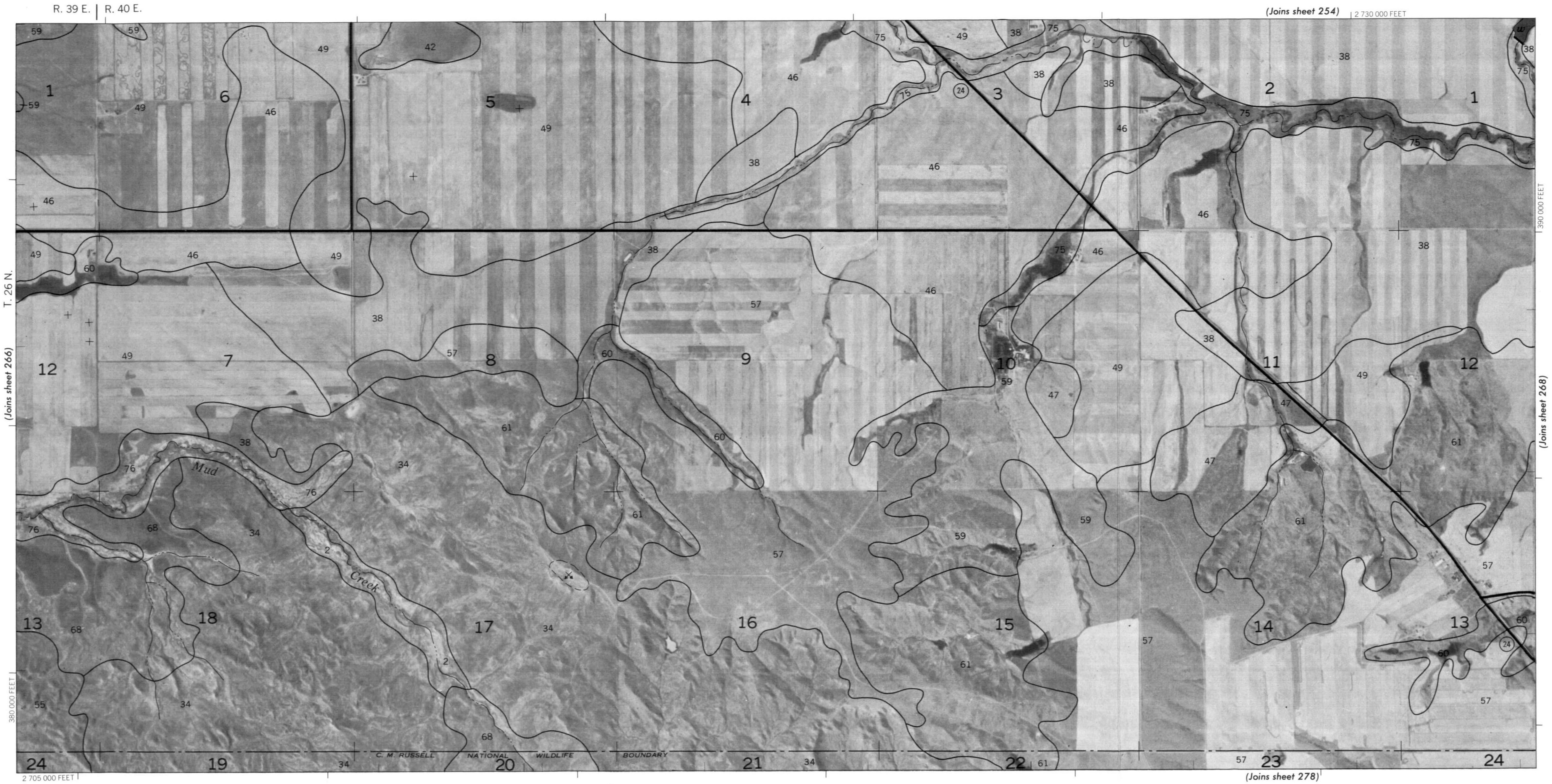
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



1 ¾ ½ ¼ 0 1 2 Miles

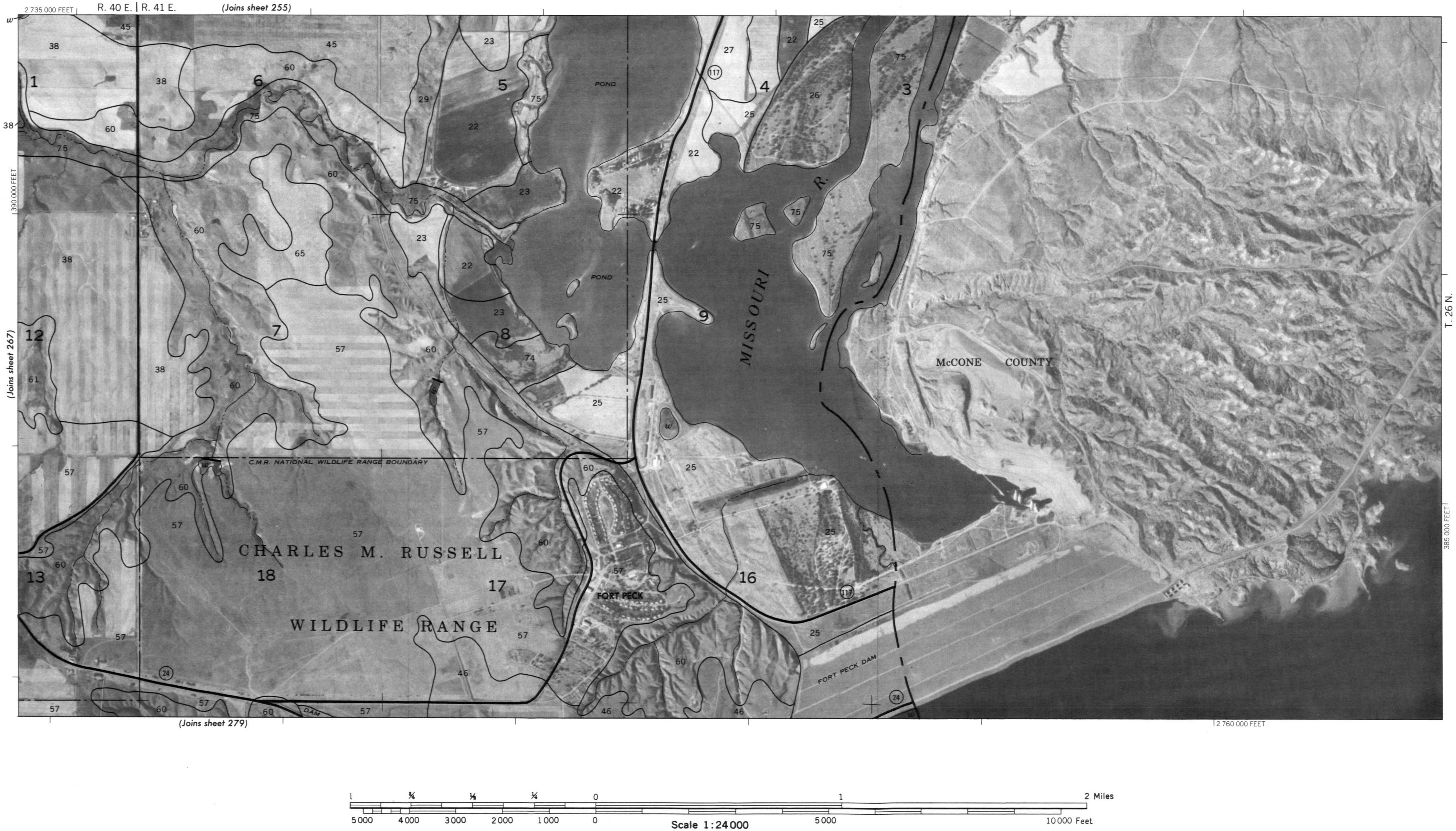
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 267

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 268



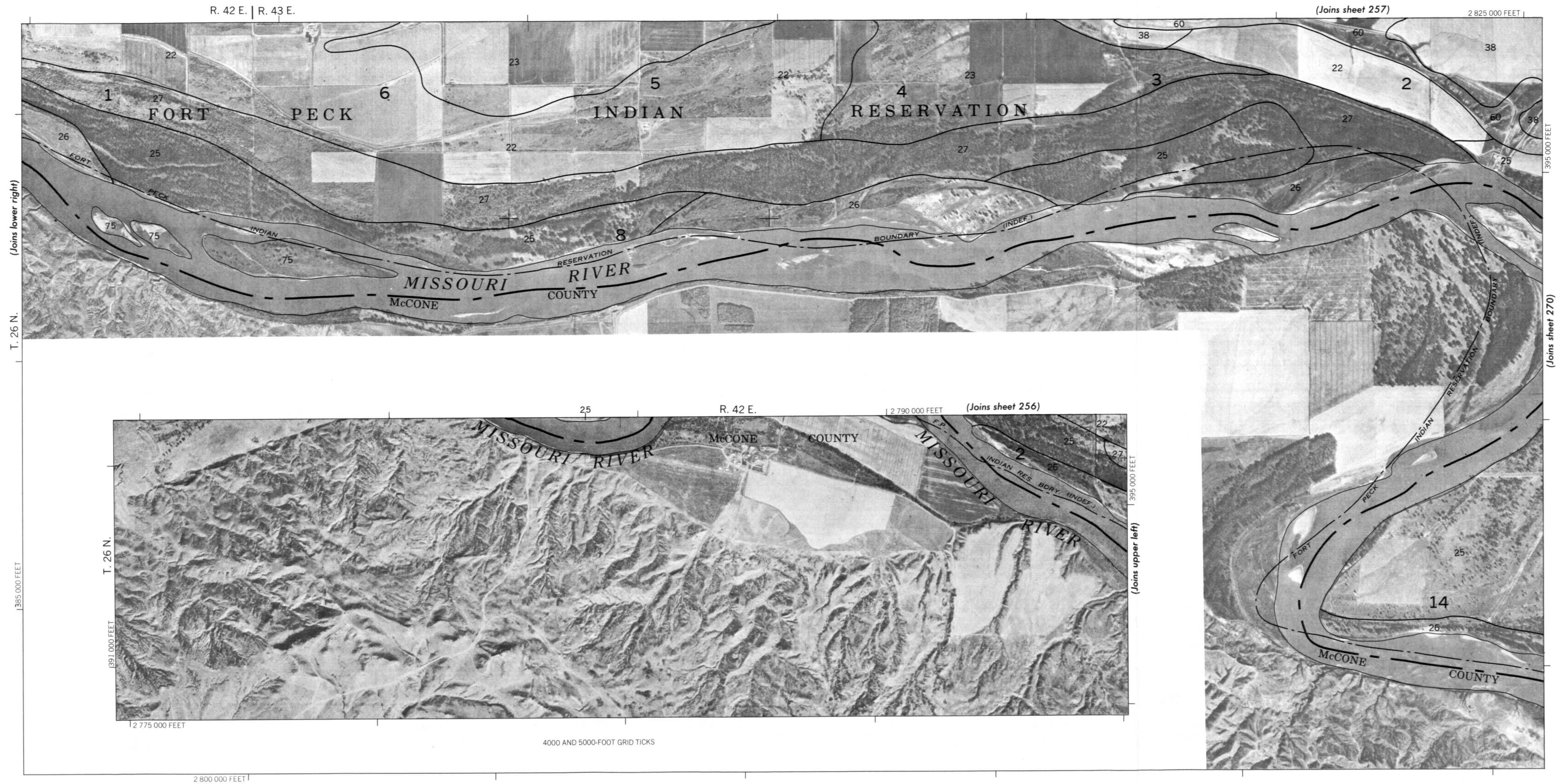
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA NO. 269

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

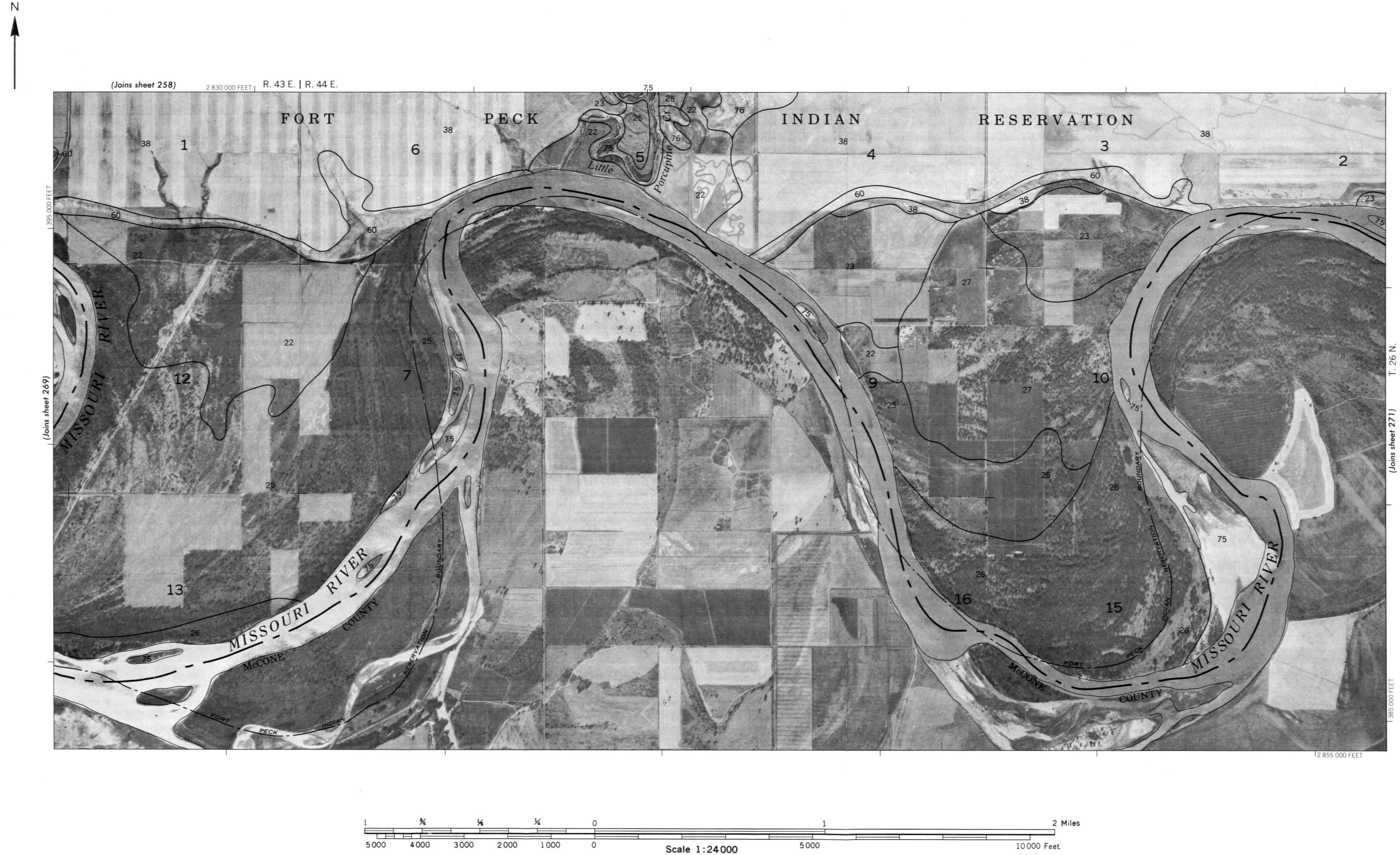


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 270

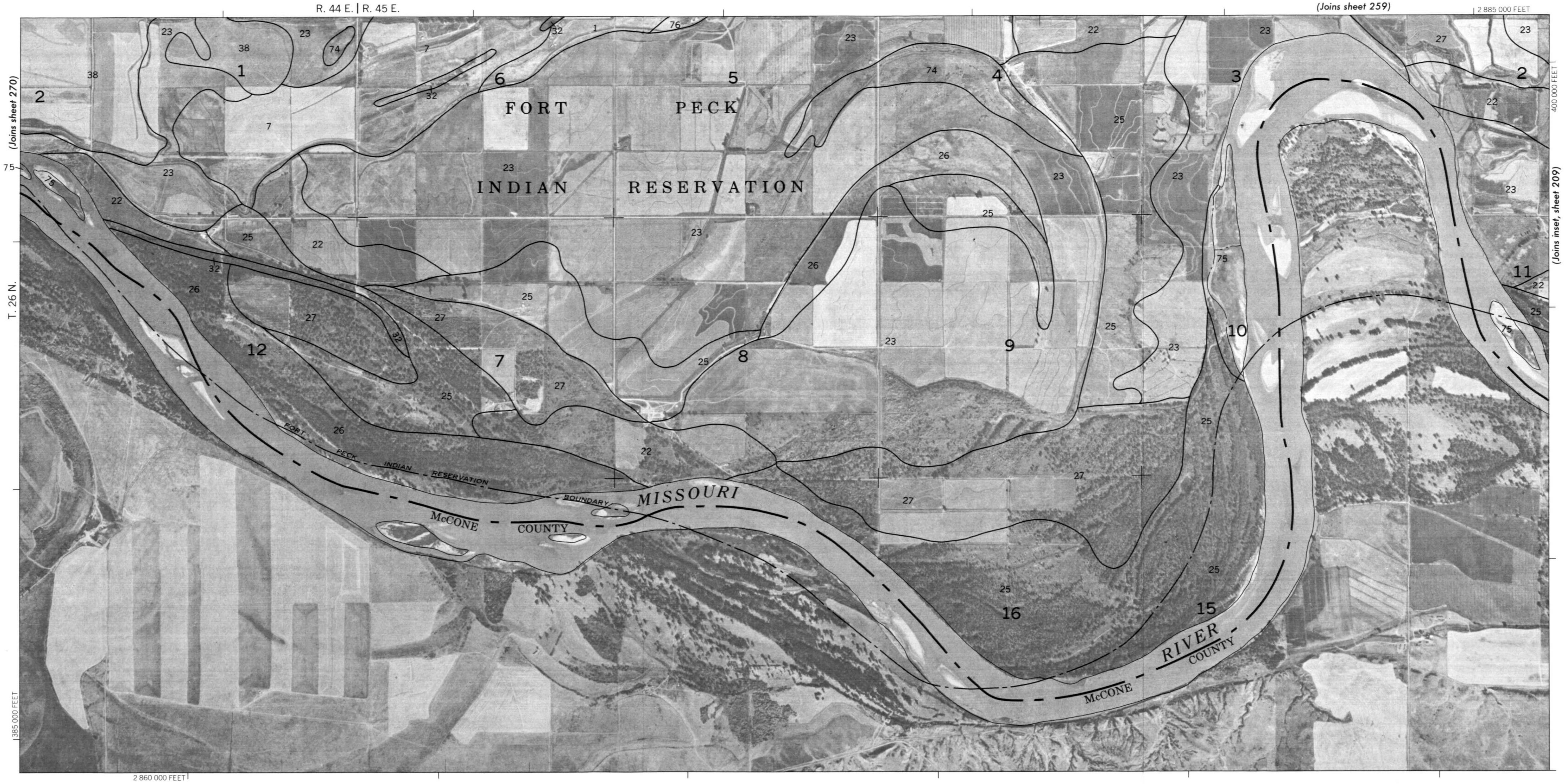


5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 270

N



1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

Scale 1:24 000

VALLEY COUNTY, MONTANA NO. 271

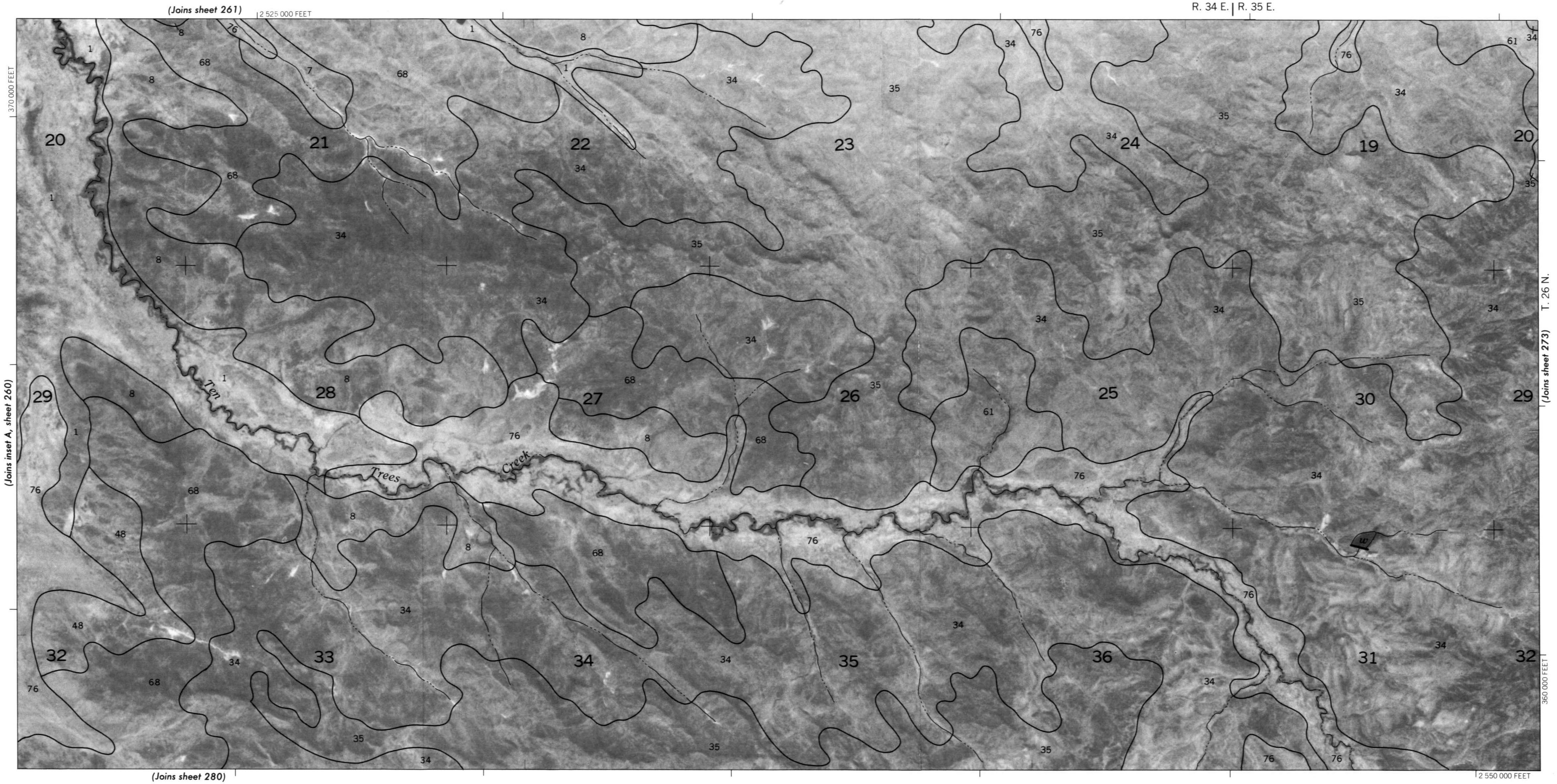
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

272

VALLEY COUNTY, MONTANA — SHEET NUMBER 272

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

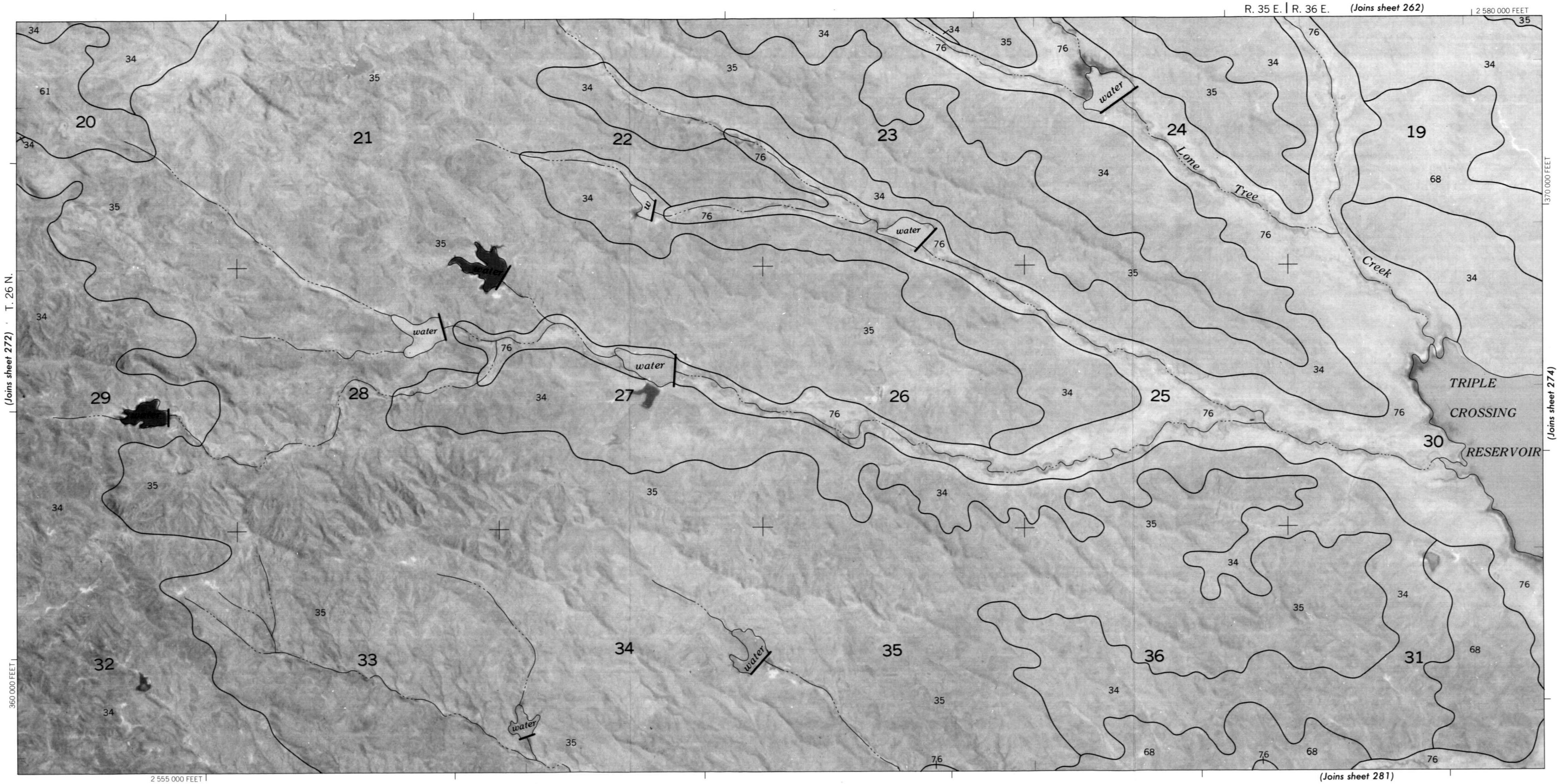
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 272

273

N



VALLEY COUNTY, MONTANA NO. 273

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

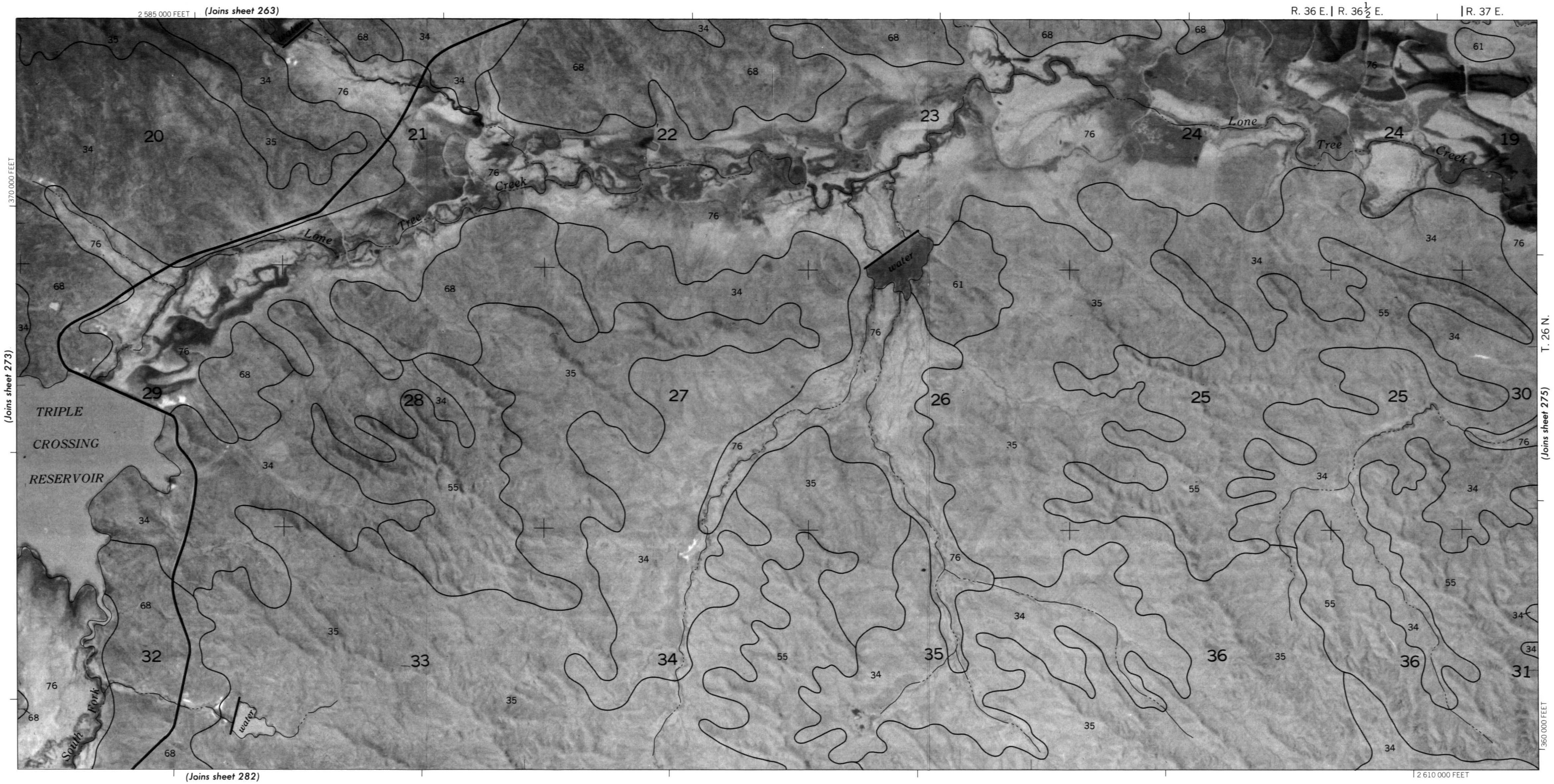
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

274

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

275

N

VALLEY COUNTY, MONTANA NO. 275

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

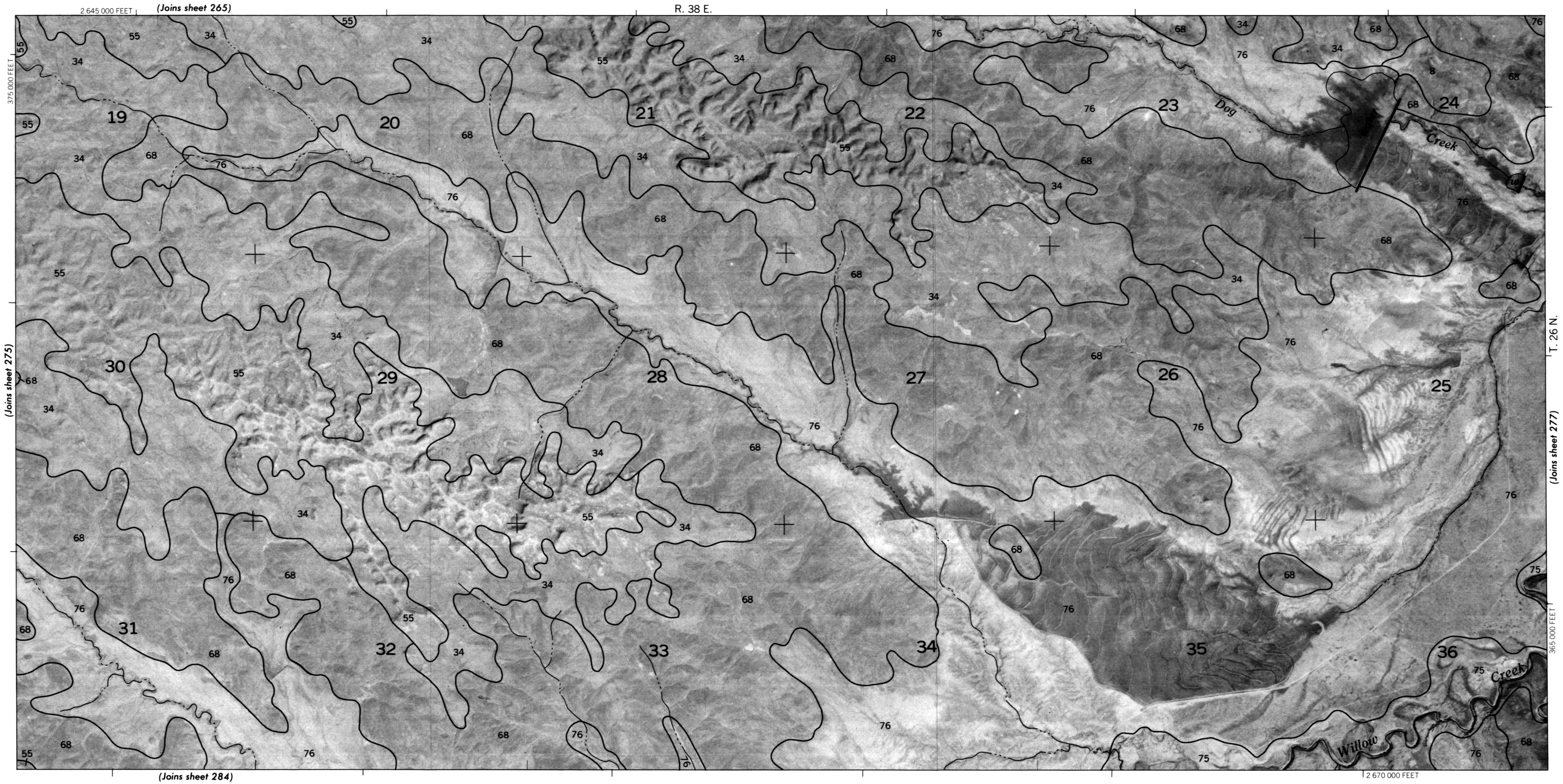
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

276

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 276



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

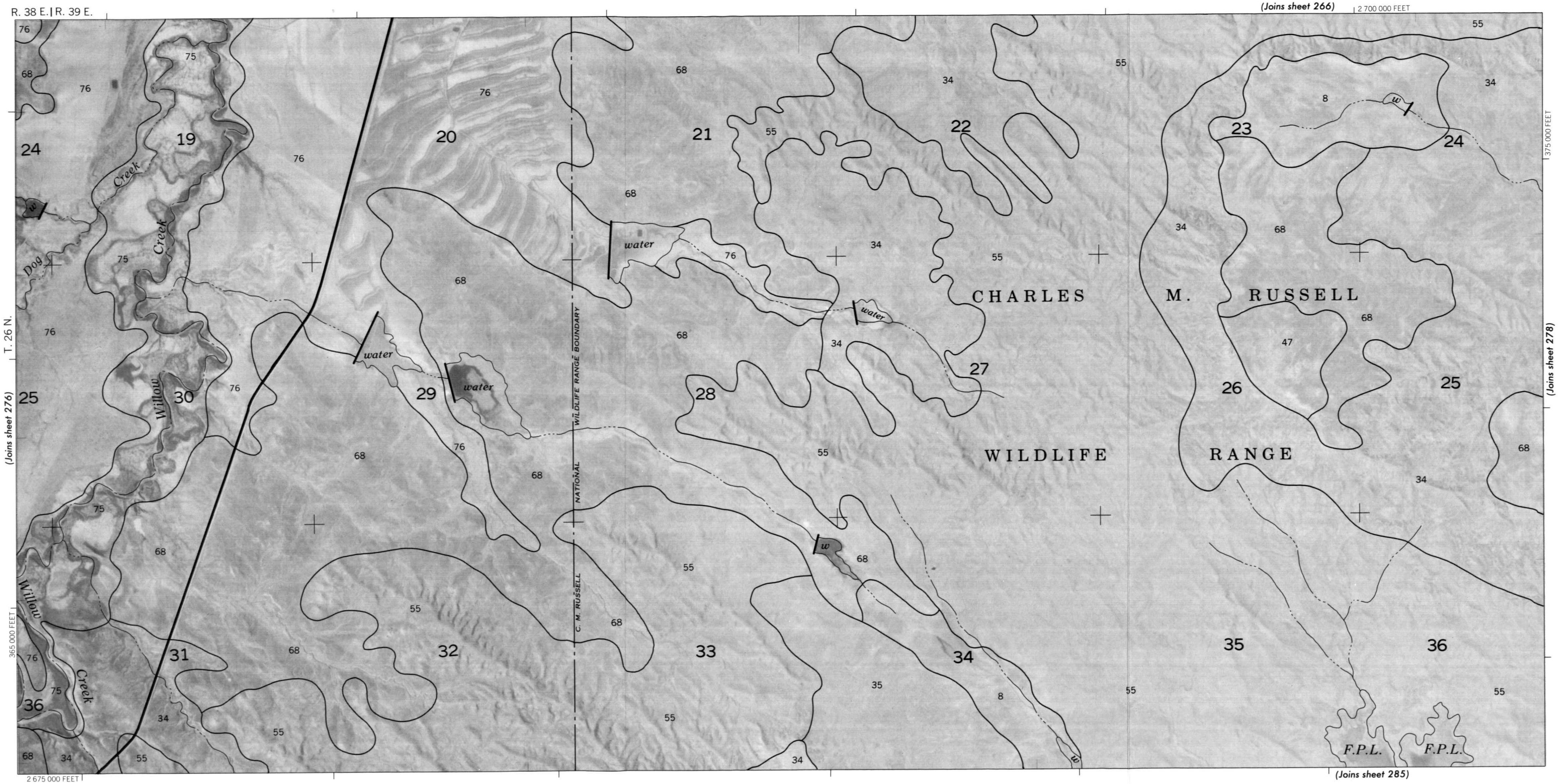
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 276

N

VALLEY COUNTY, MONTANA NO. 277

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

278

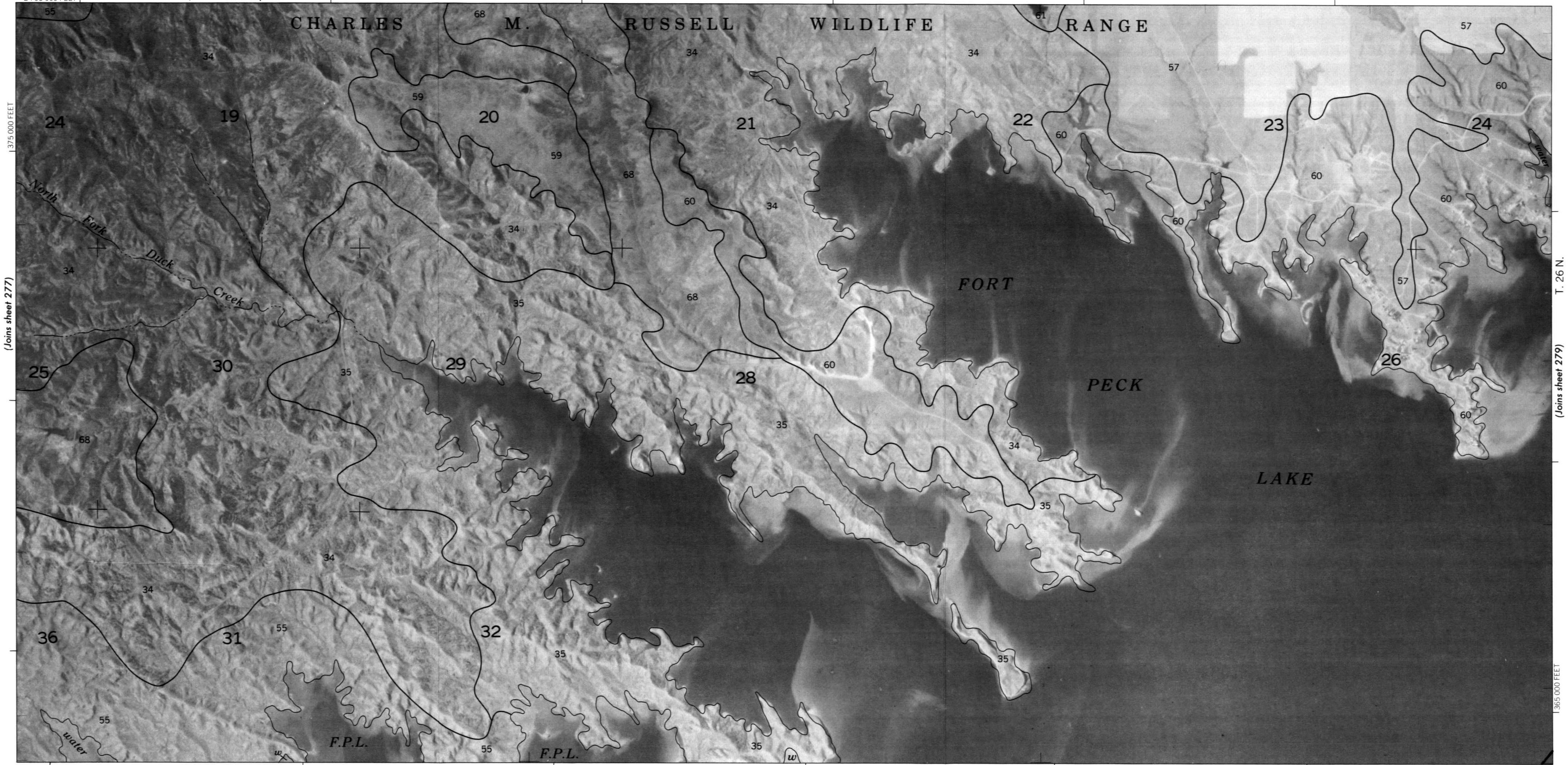
N

VALLEY COUNTY, MONTANA — SHEET NUMBER 278

R. 39 E. | R. 40 E.

2 705 000 FEET

(Joins sheet 267)



(Joins sheet 277)

(Joins sheet 279)

(Joins sheet 286)

2 730 000 FEET

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

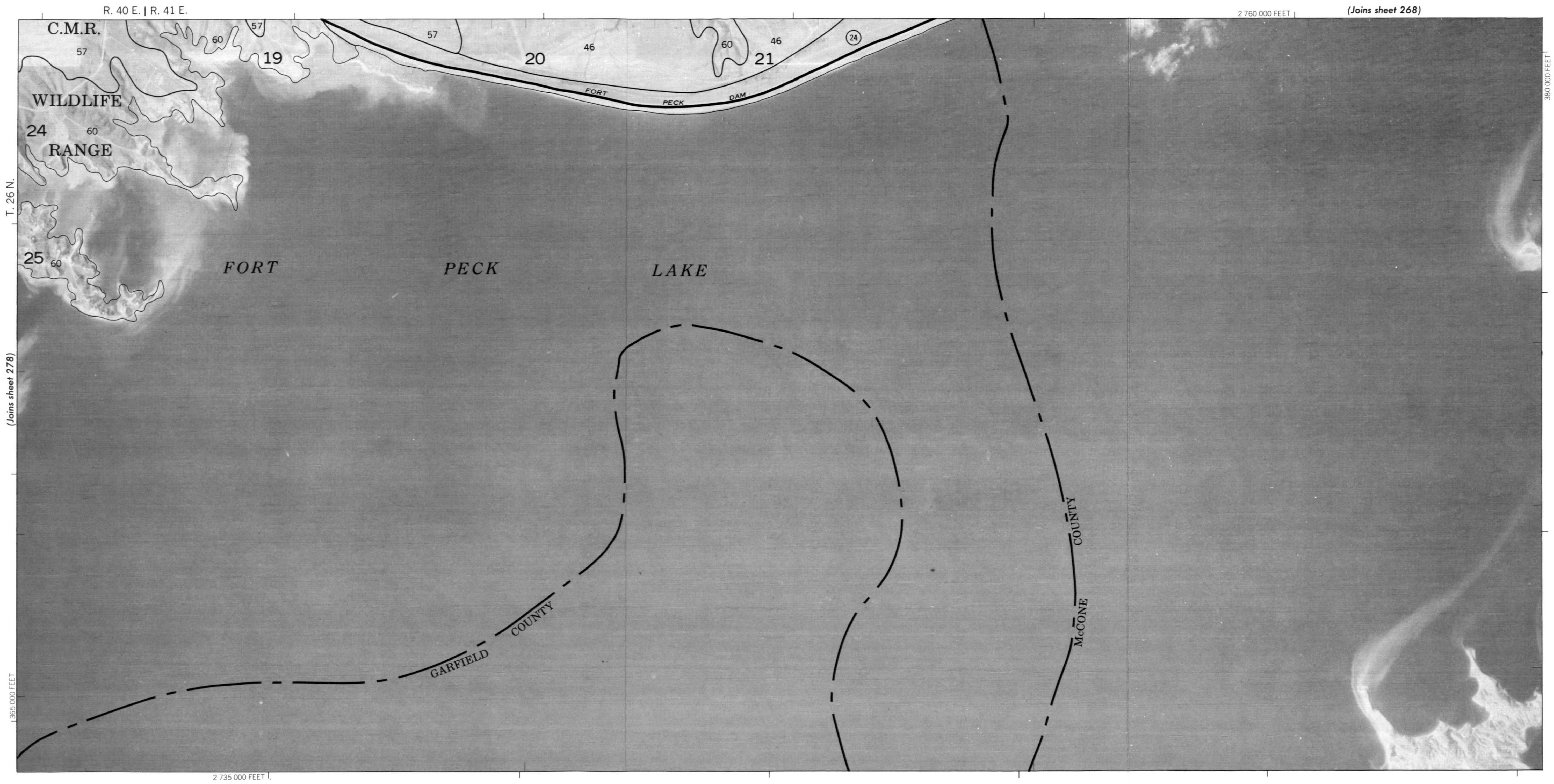
Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 278

279



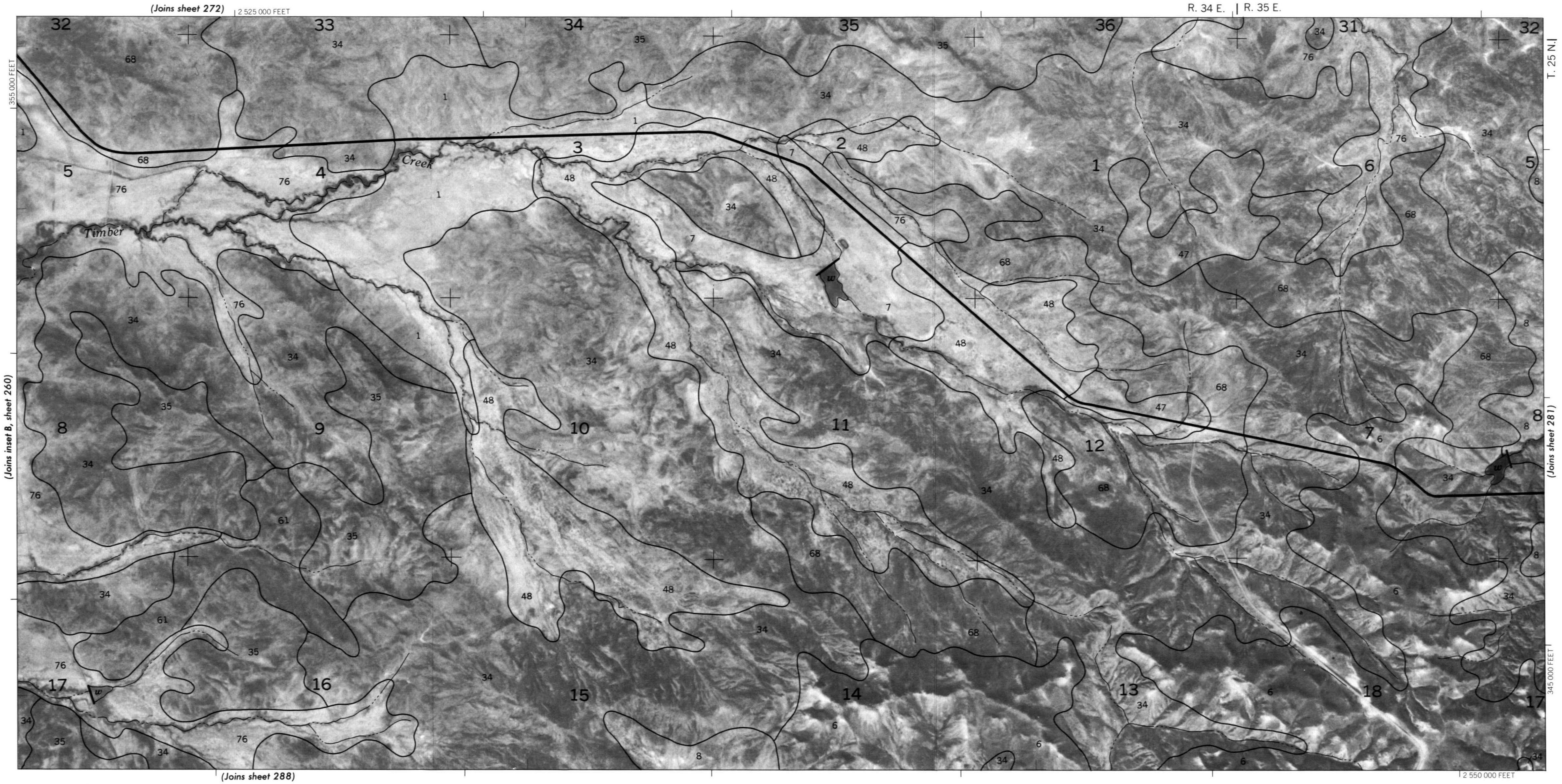
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 279

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 280



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

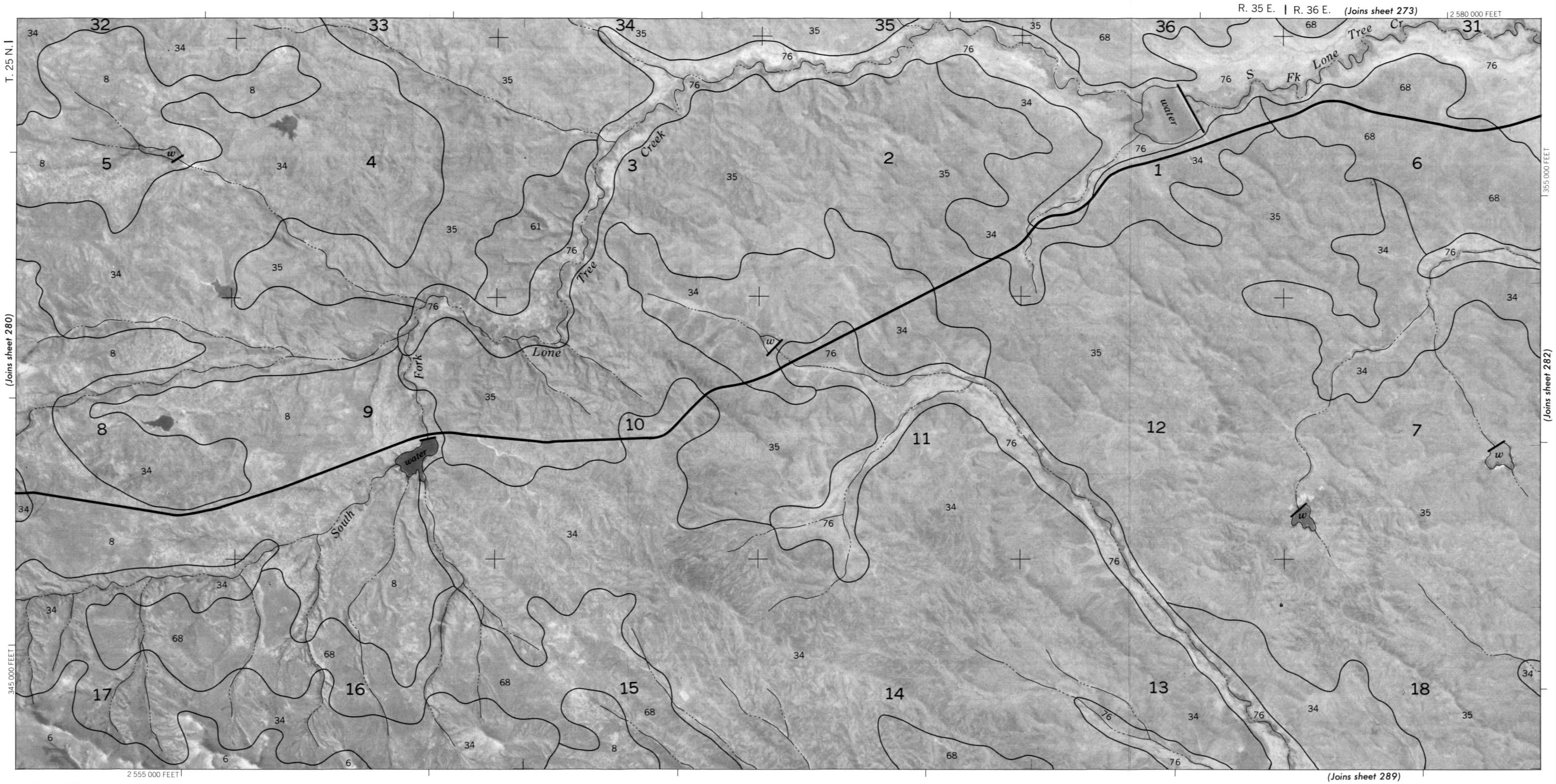
Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

281

N



VALLEY COUNTY, MONTANA NO. 281

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

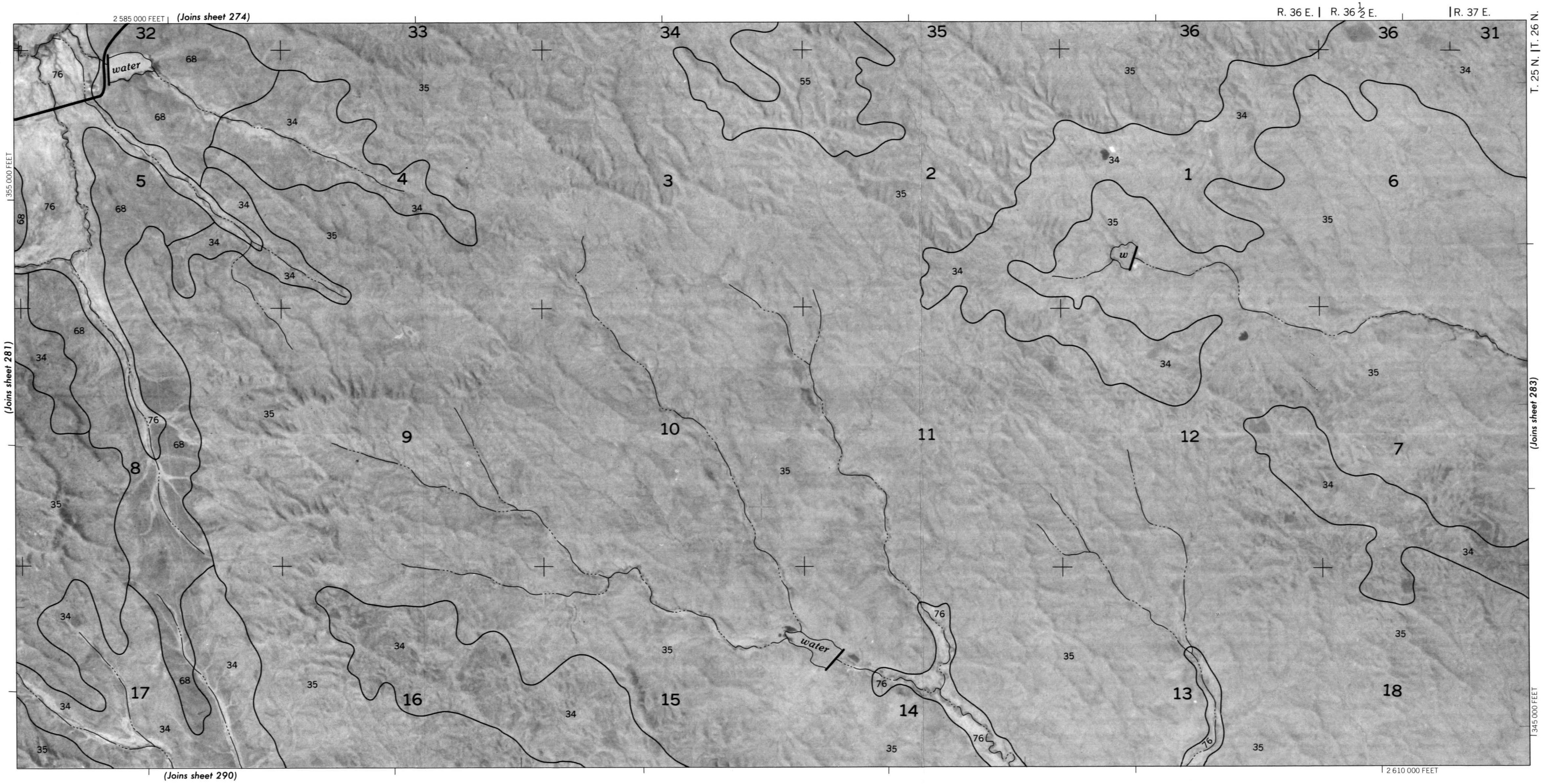
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

282

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 282



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

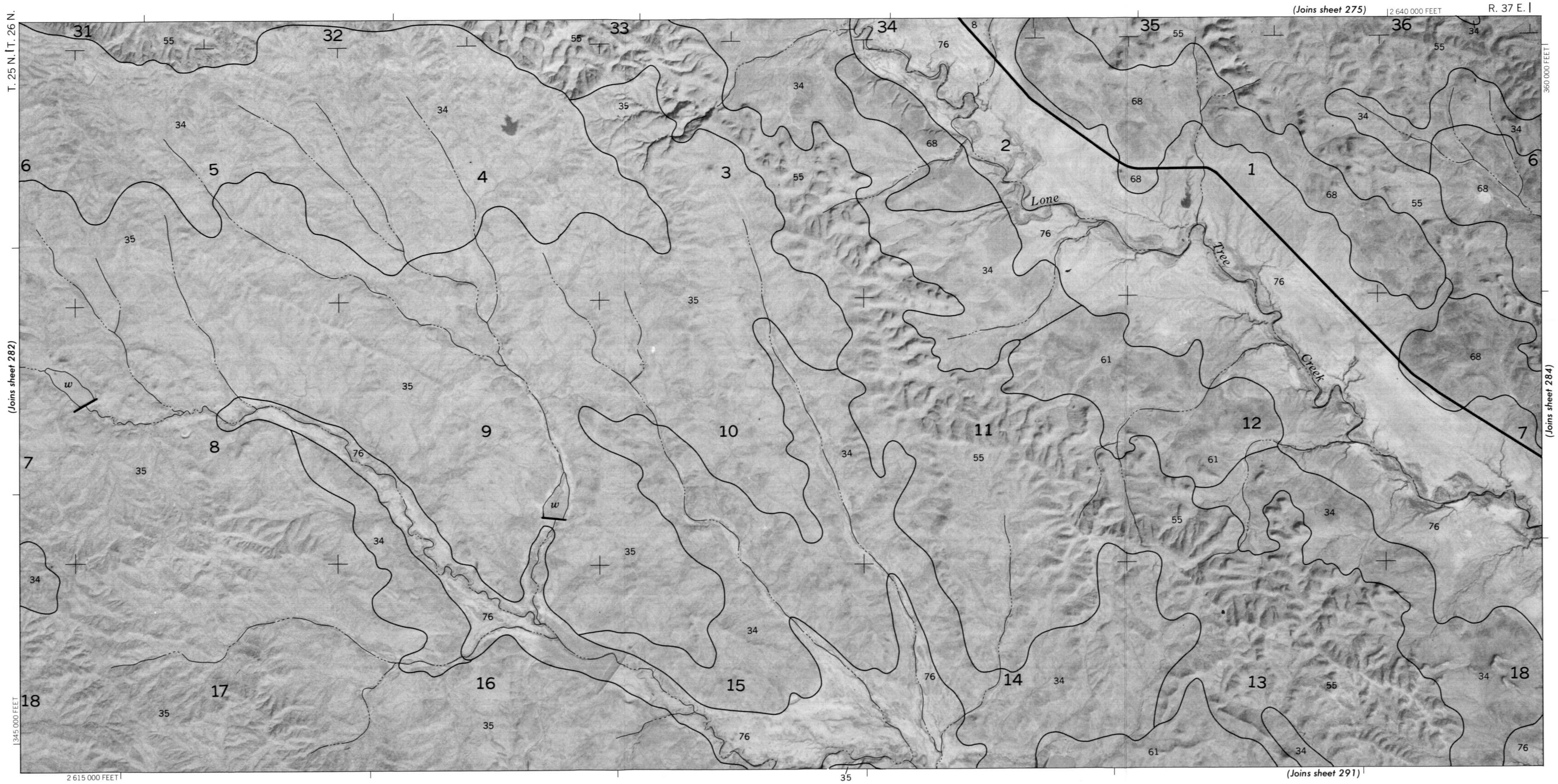
VALLEY COUNTY, MONTANA NO. 282

283

N

VALLEY COUNTY, MONTANA NO. 283

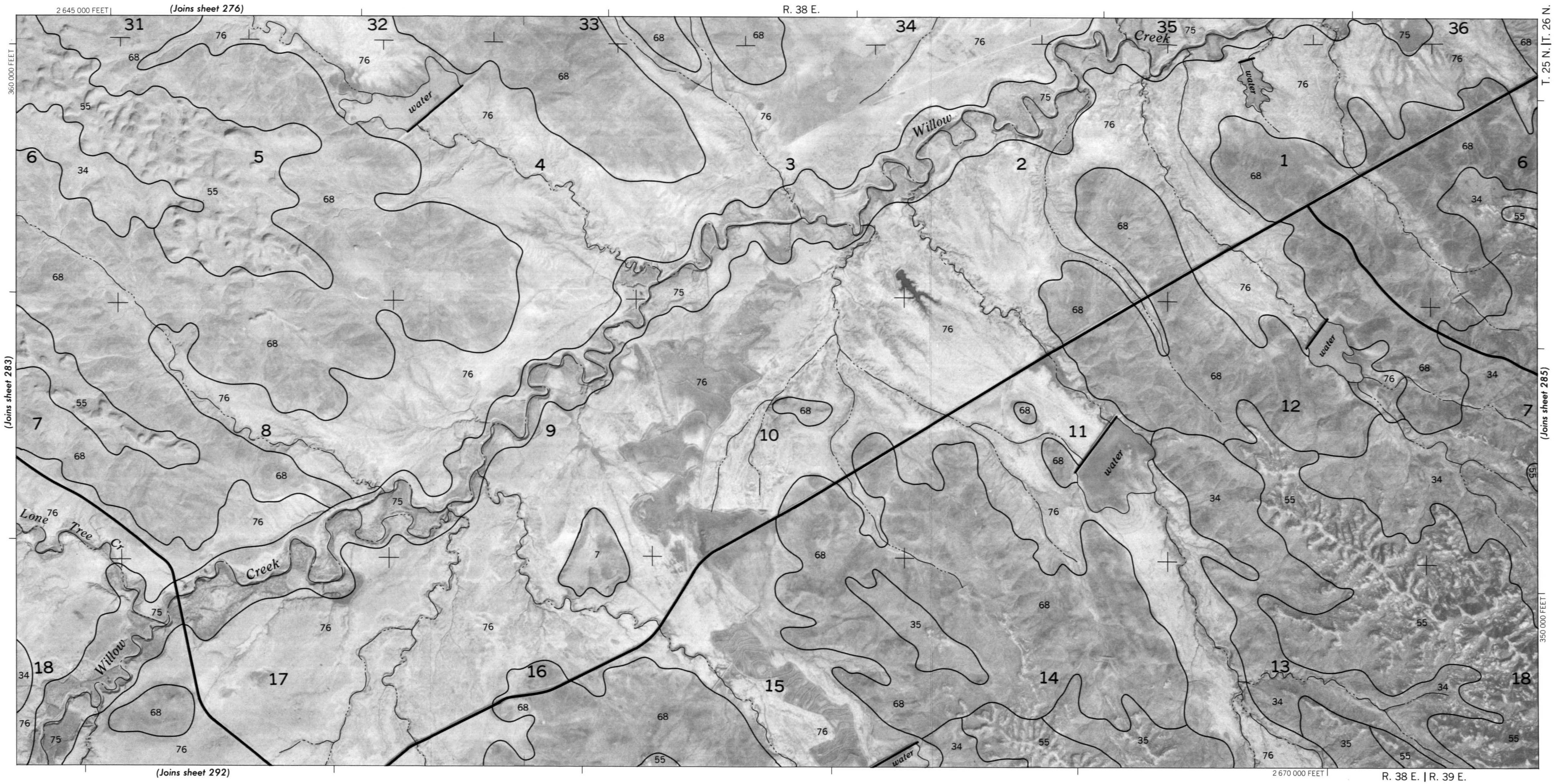
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 284



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

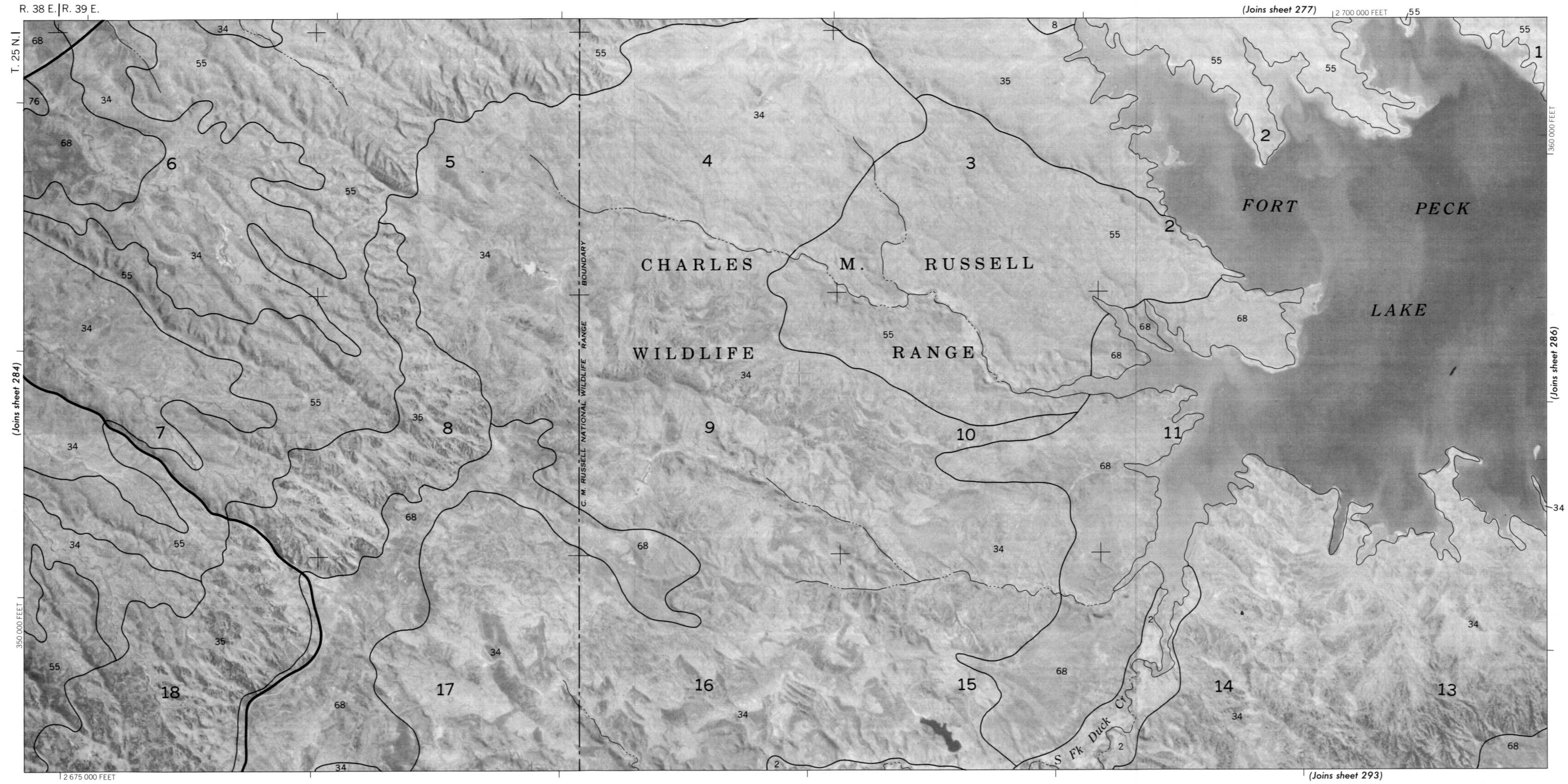
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 284

VALLEY COUNTY, MONTANA NO. 285

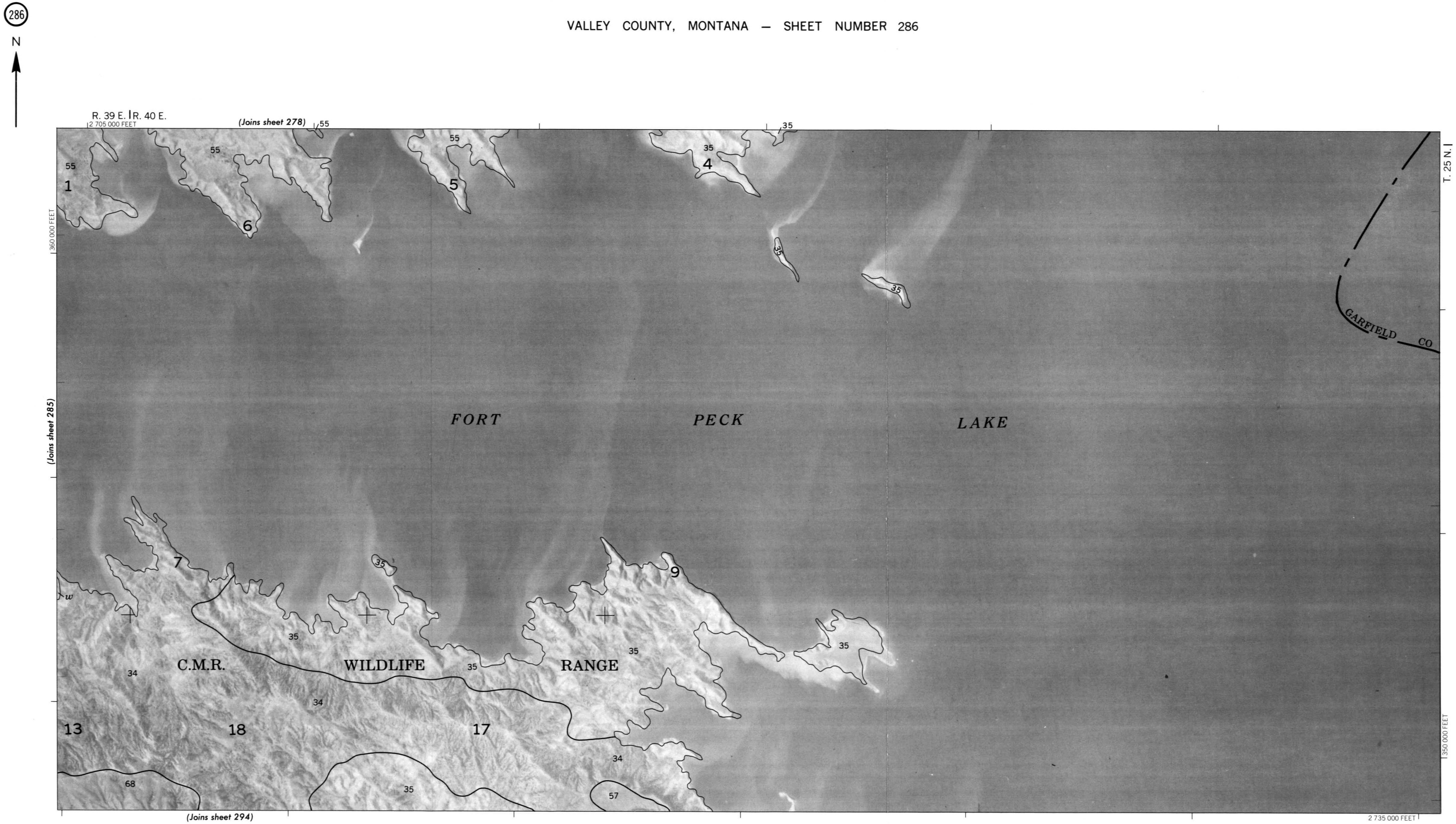
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



N

1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 286



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

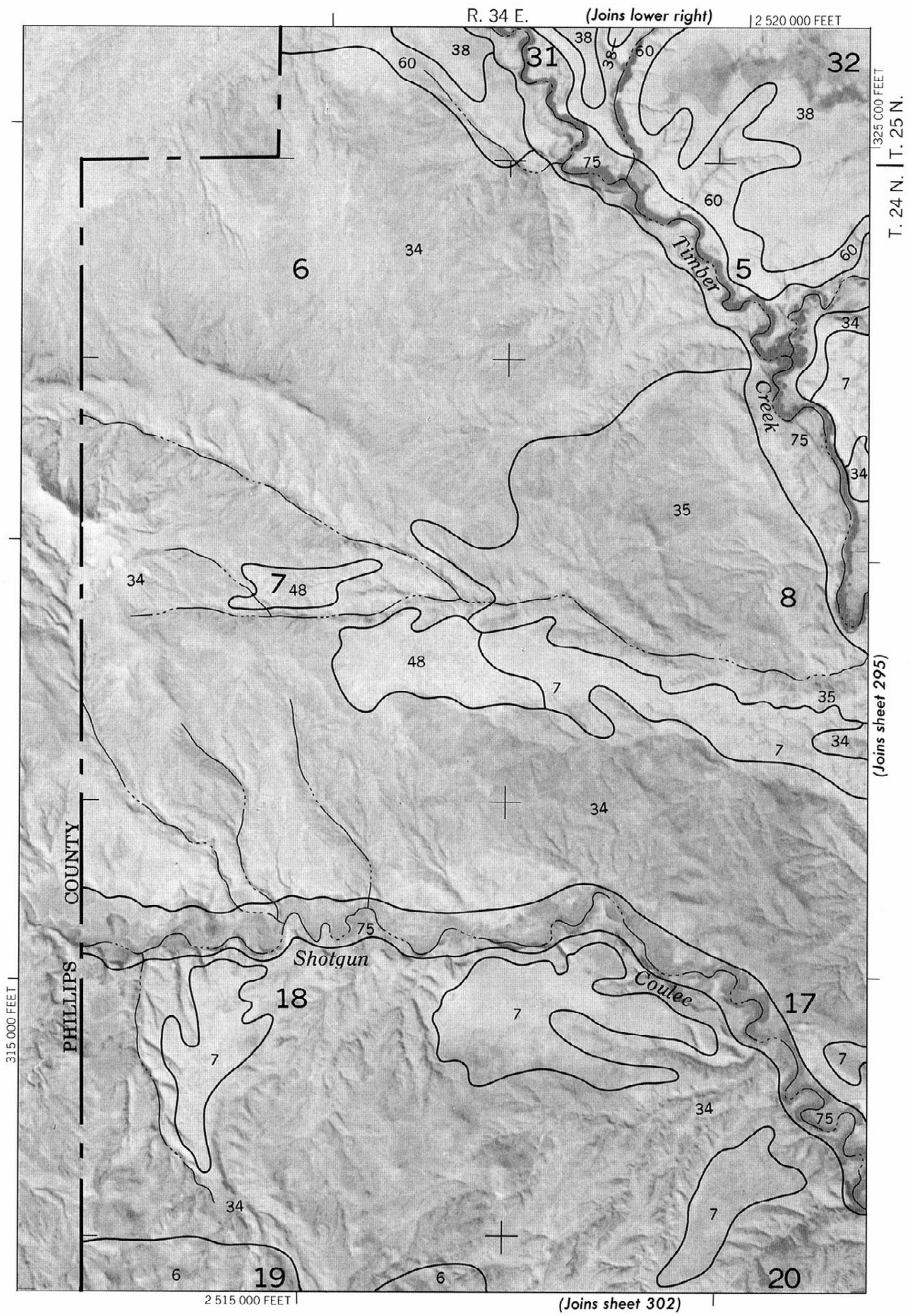
VALLEY COUNTY, MONTANA NO. 286

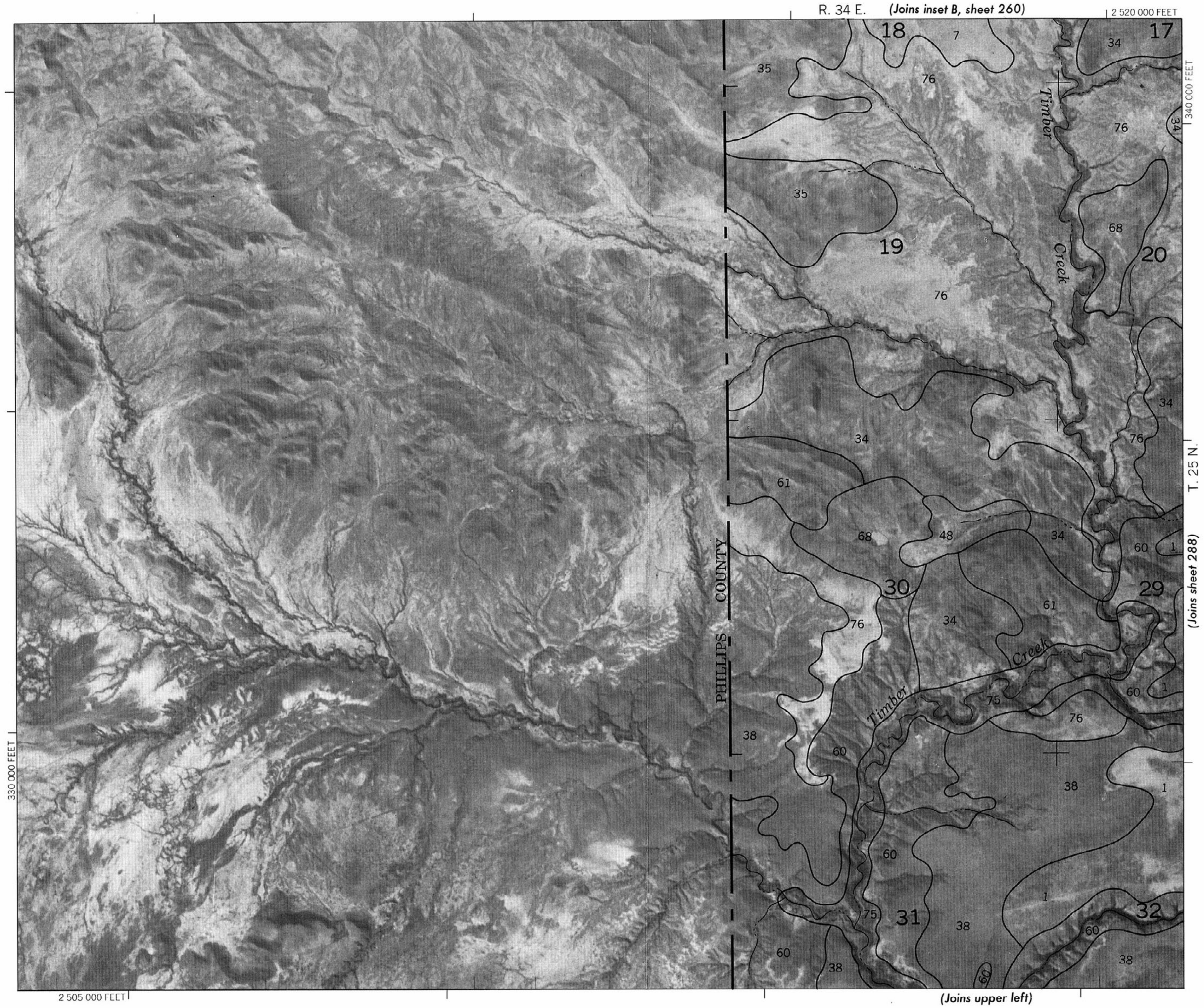
287

N

VALLEY COUNTY, MONTANA NO. 287

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.





1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

288

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 288

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

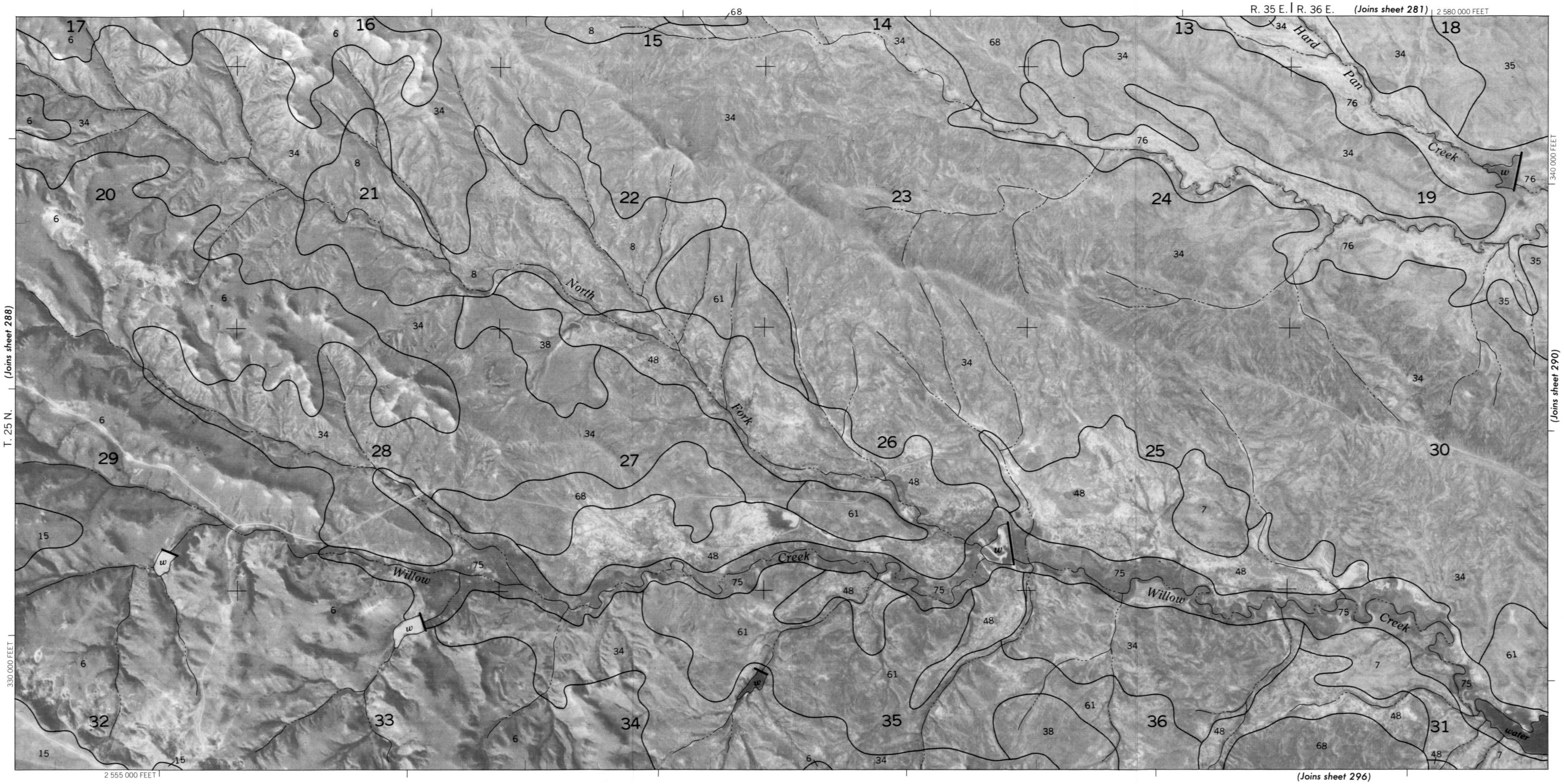
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

VALLEY COUNTY, MONTANA NO. 288

N

VALLEY COUNTY, MONTANA NO. 289

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

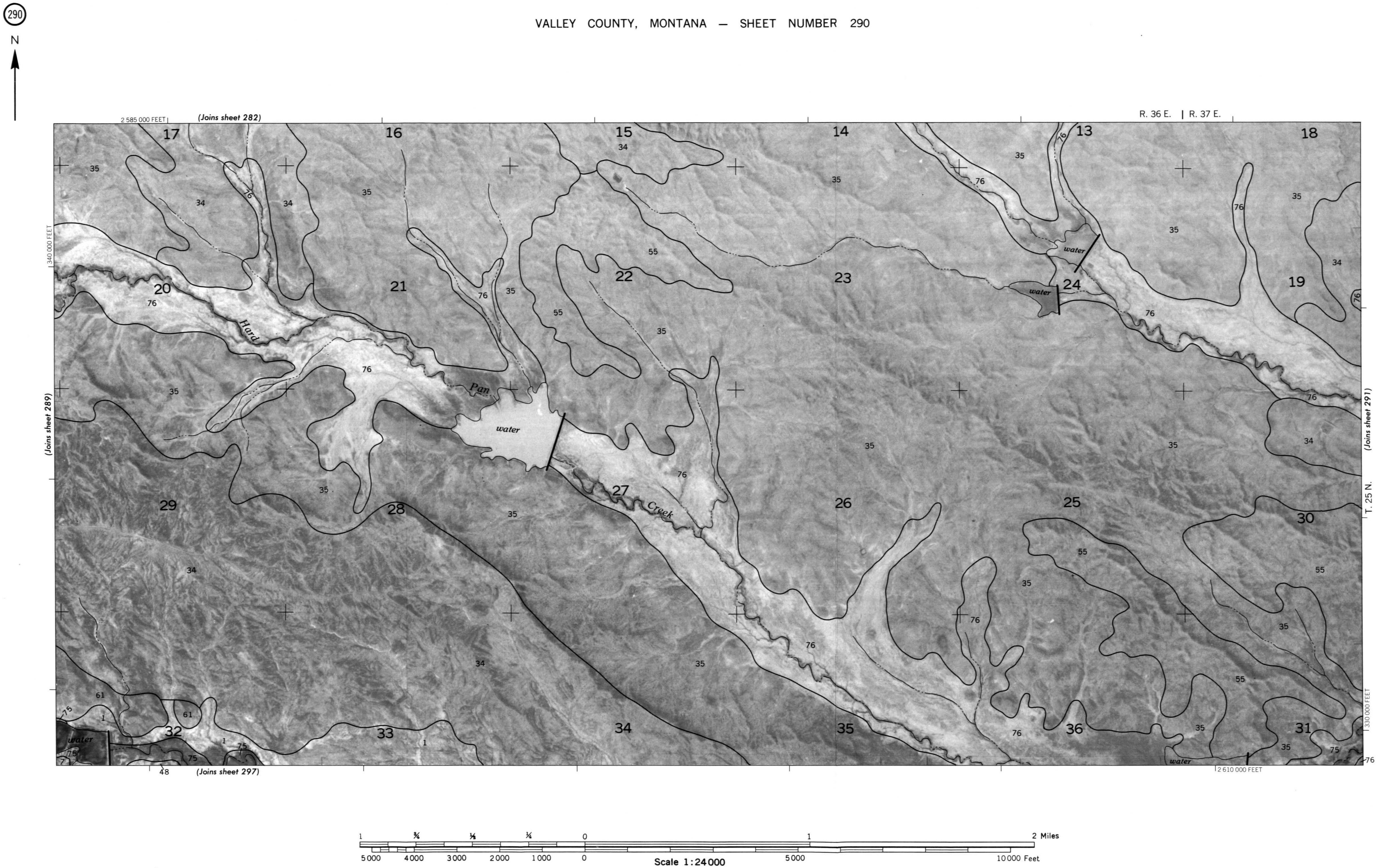


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 290



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

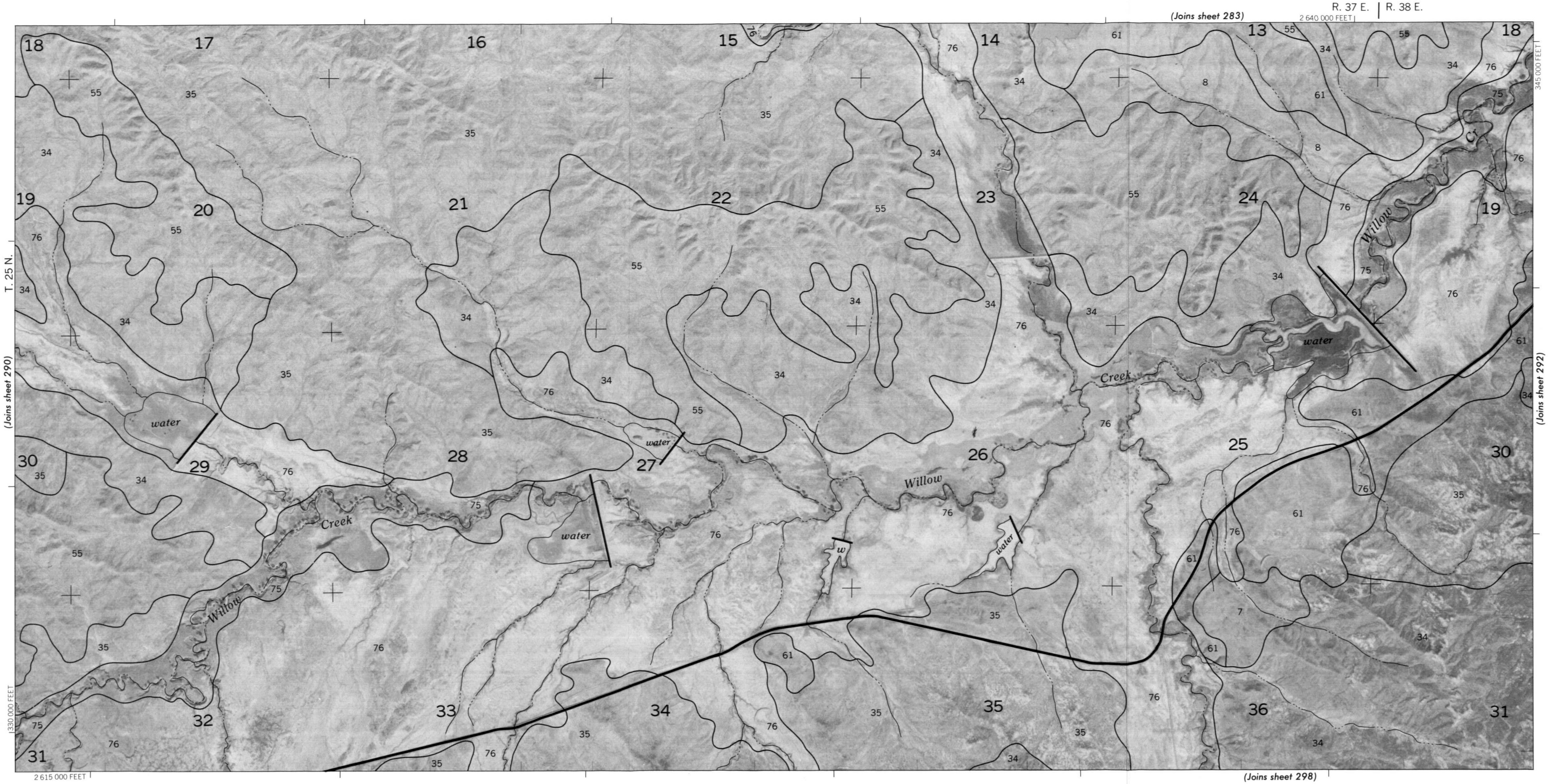
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

291

N

VALLEY COUNTY, MONTANA NO. 291

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

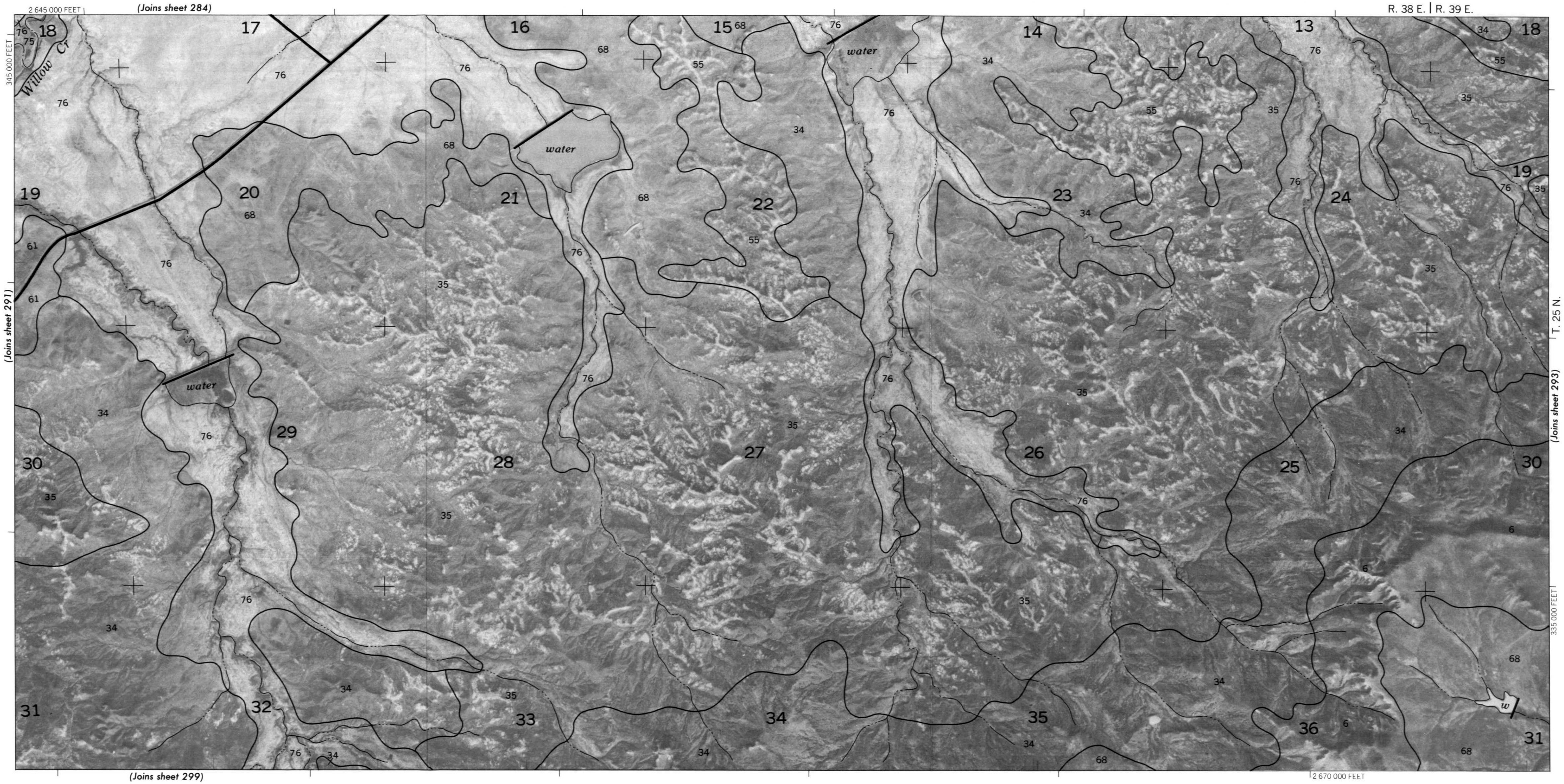


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

292



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

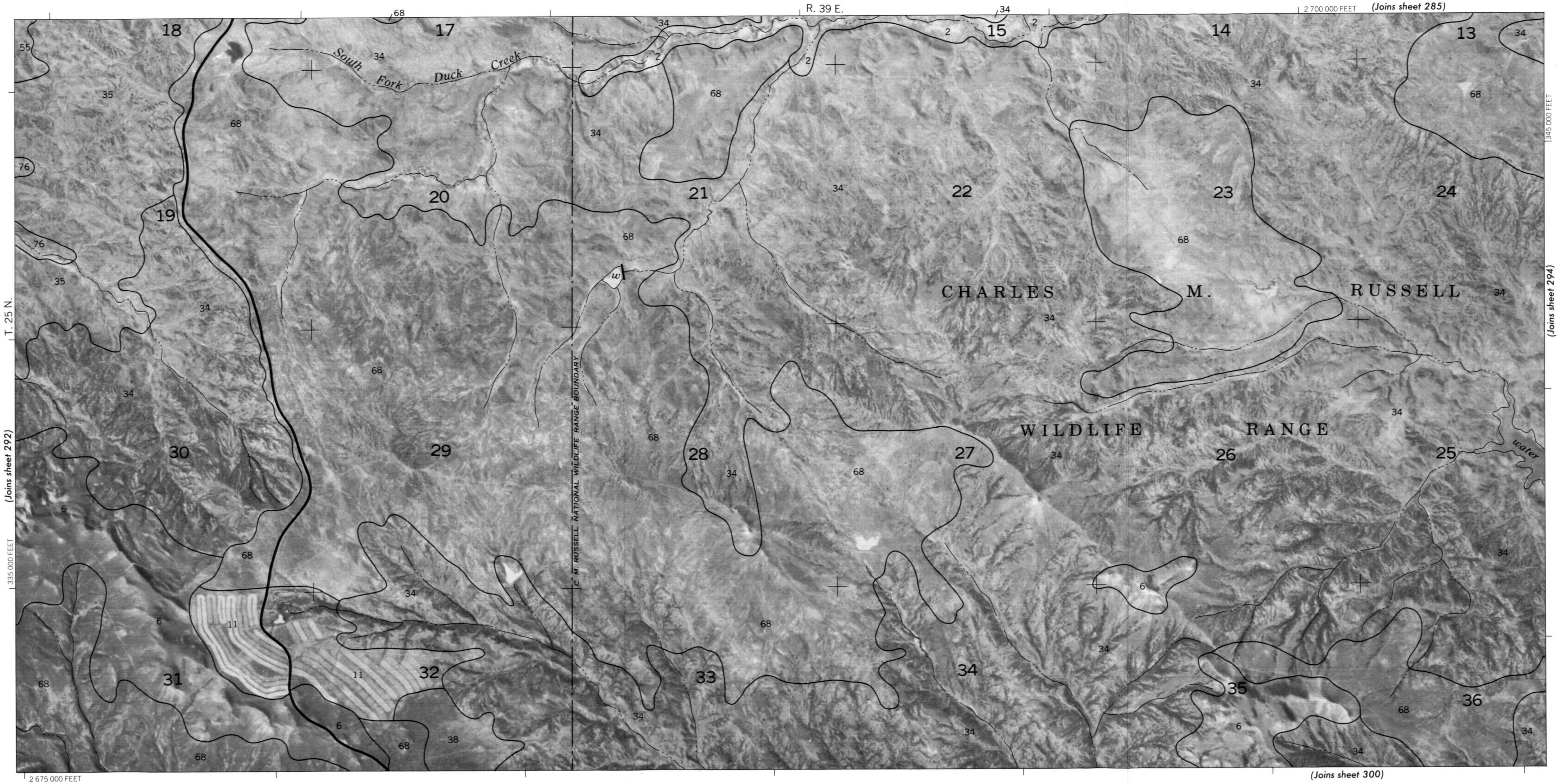
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA NO. 293

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



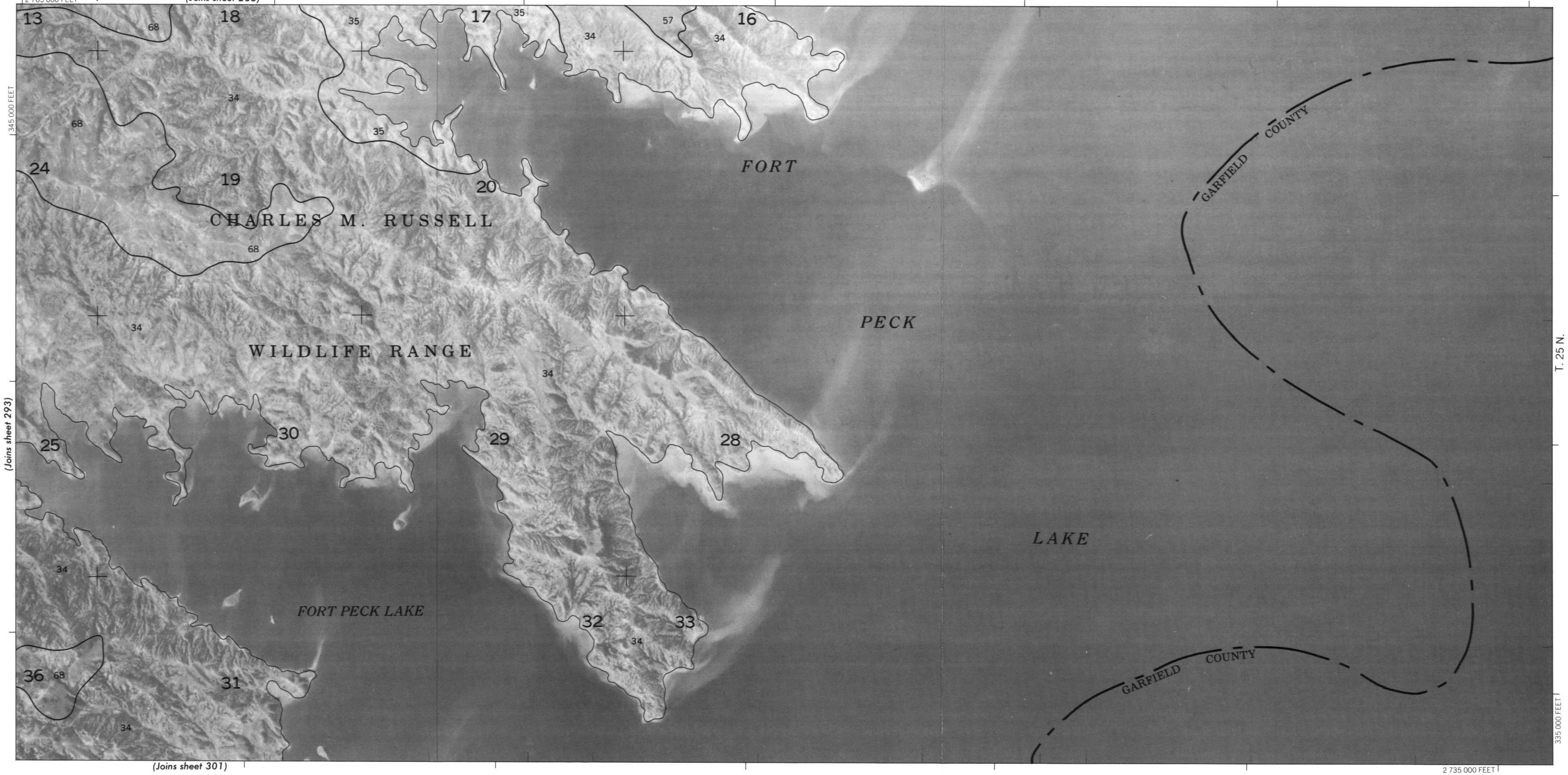
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 294



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

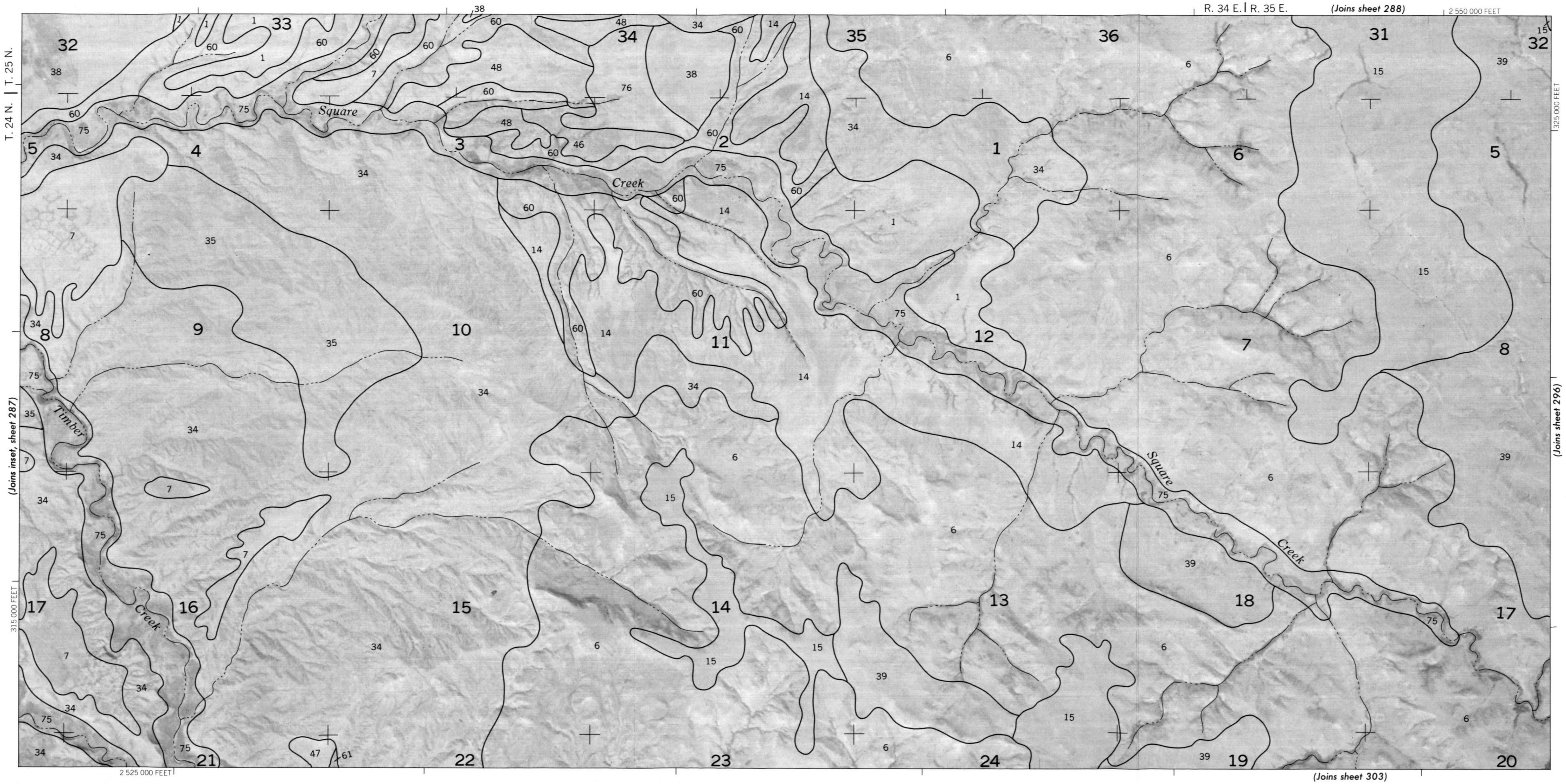
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N

VALLEY COUNTY, MONTANA NO. 295

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 296

1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

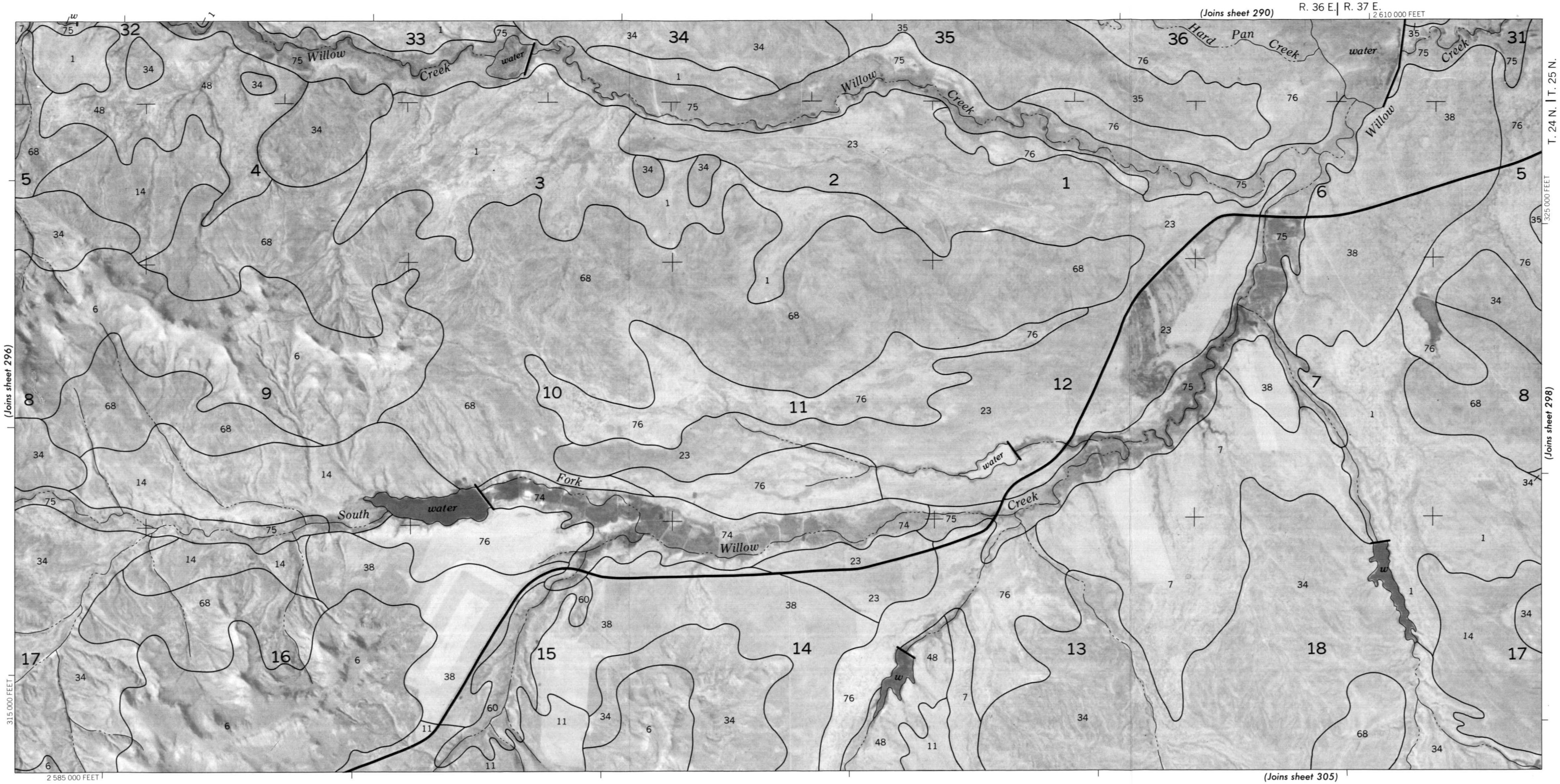
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 296

N

VALLEY COUNTY, MONTANA NO. 297

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 298

1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 298

N

VALLEY COUNTY, MONTANA NO. 299

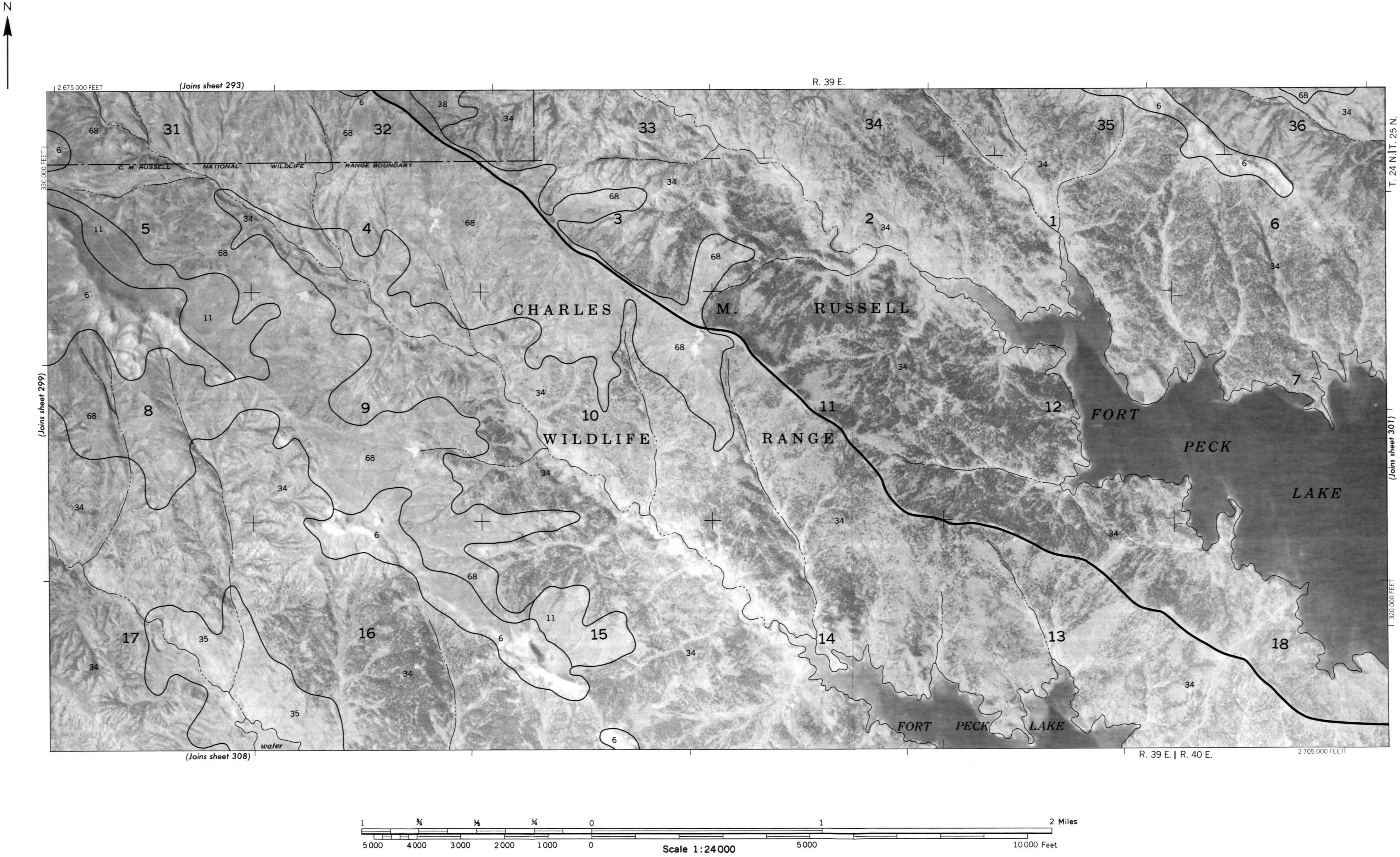
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

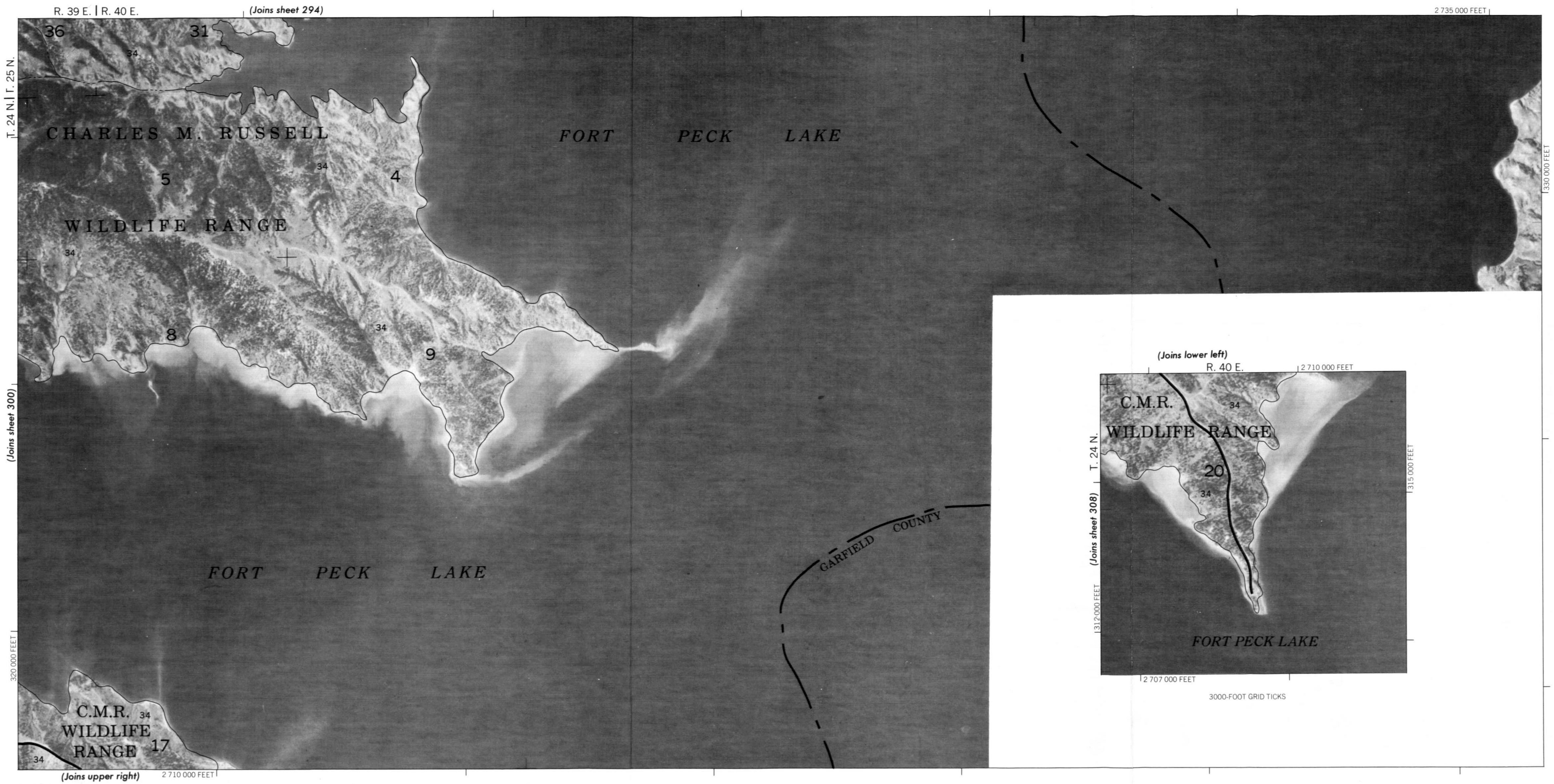
VALLEY COUNTY, MONTANA — SHEET NUMBER 300



5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

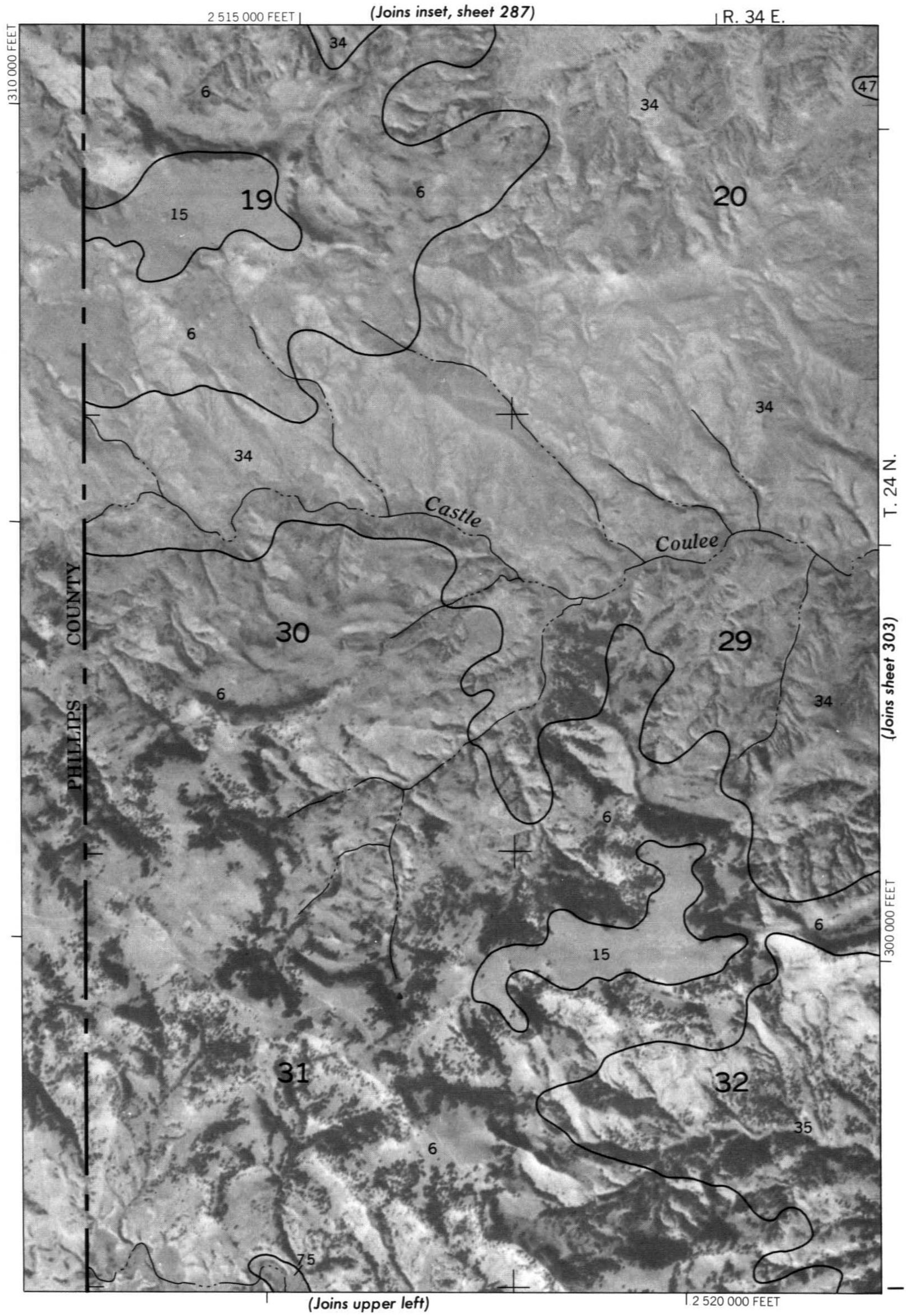
VALLEY COUNTY, MONTANA NO. 301

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 302



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA — SHEET NUMBER 303

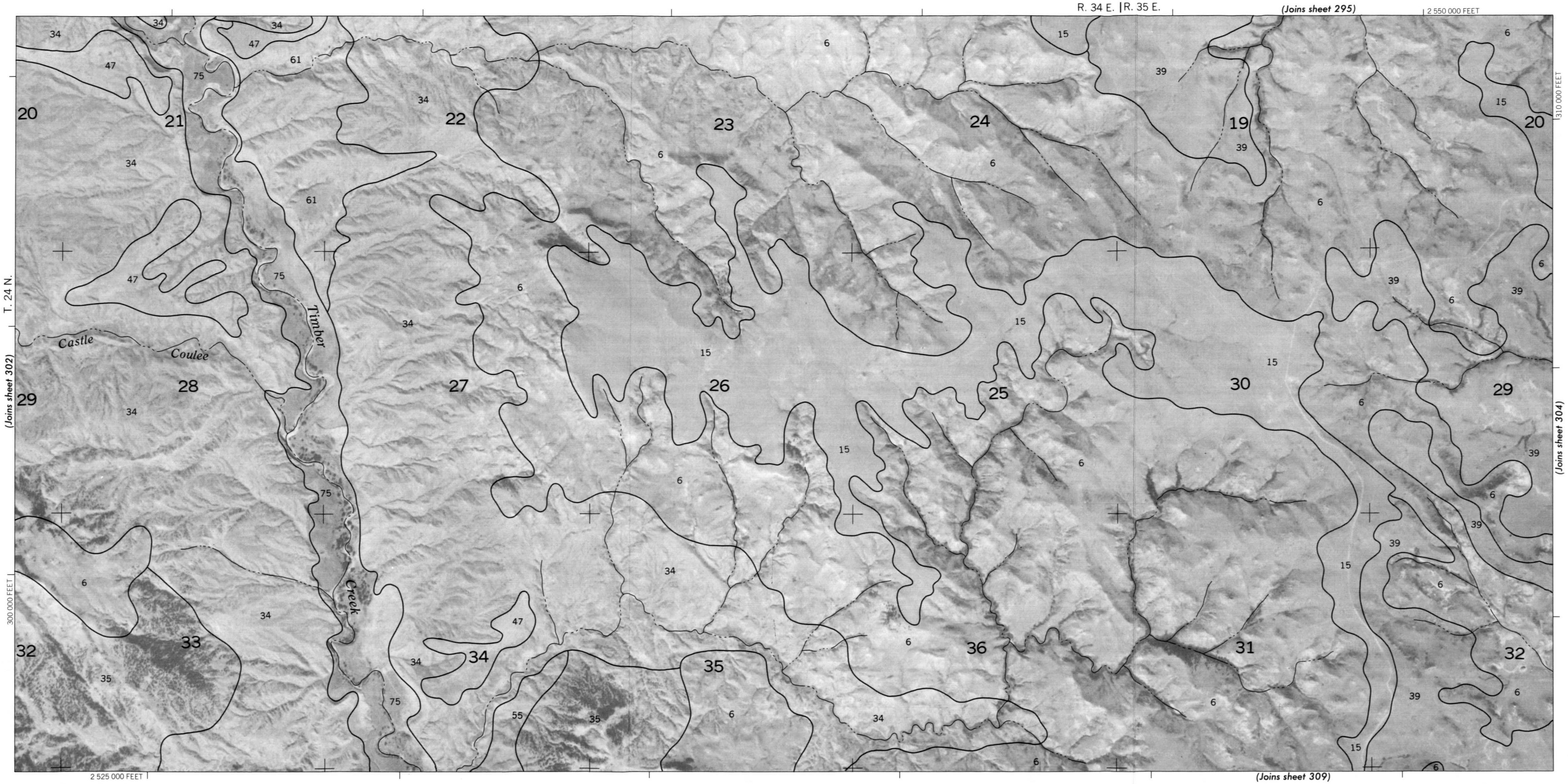
303

N

VALLEY COUNTY, MONTANA NO. 303

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

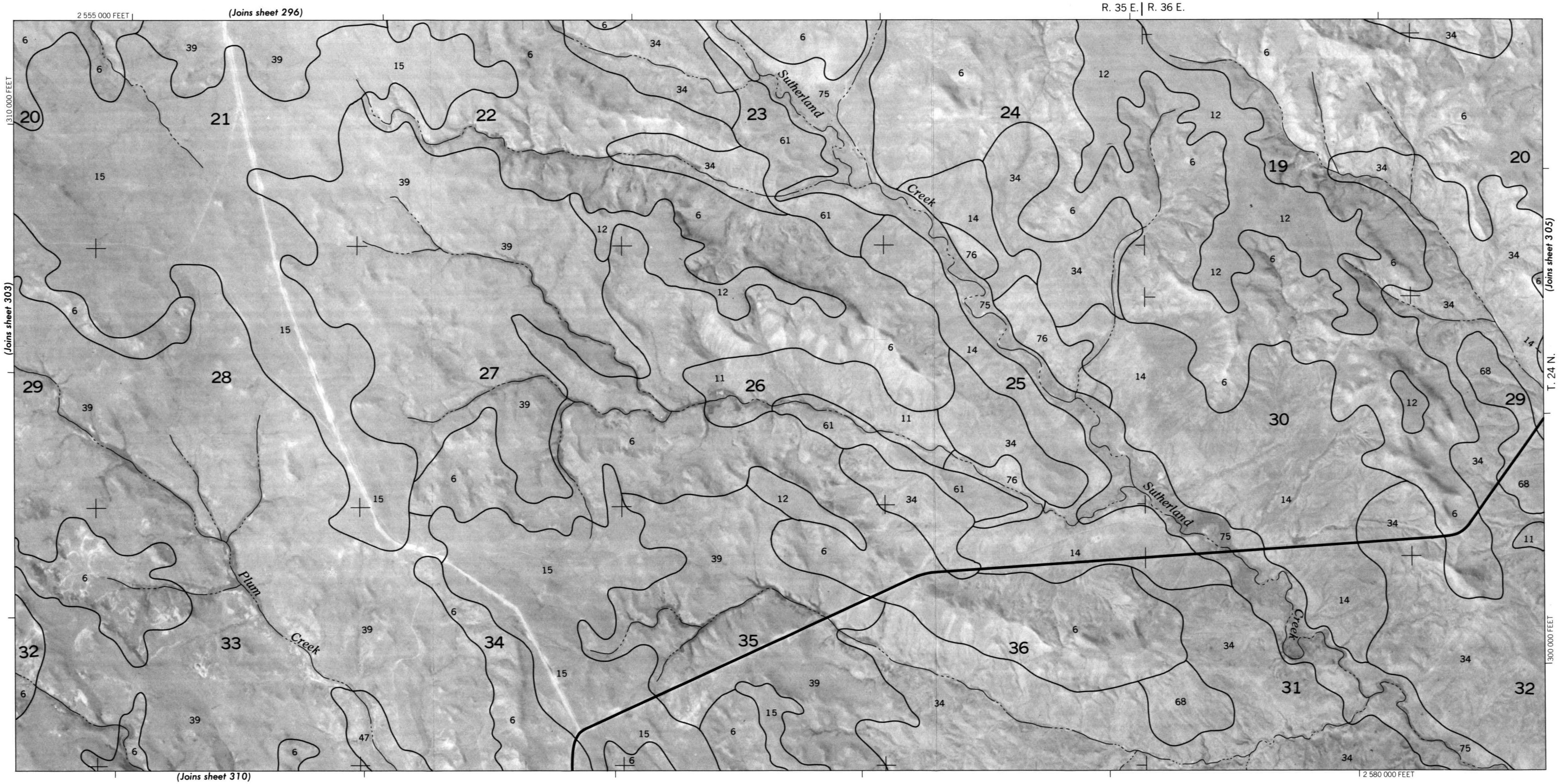
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

304

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 304



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

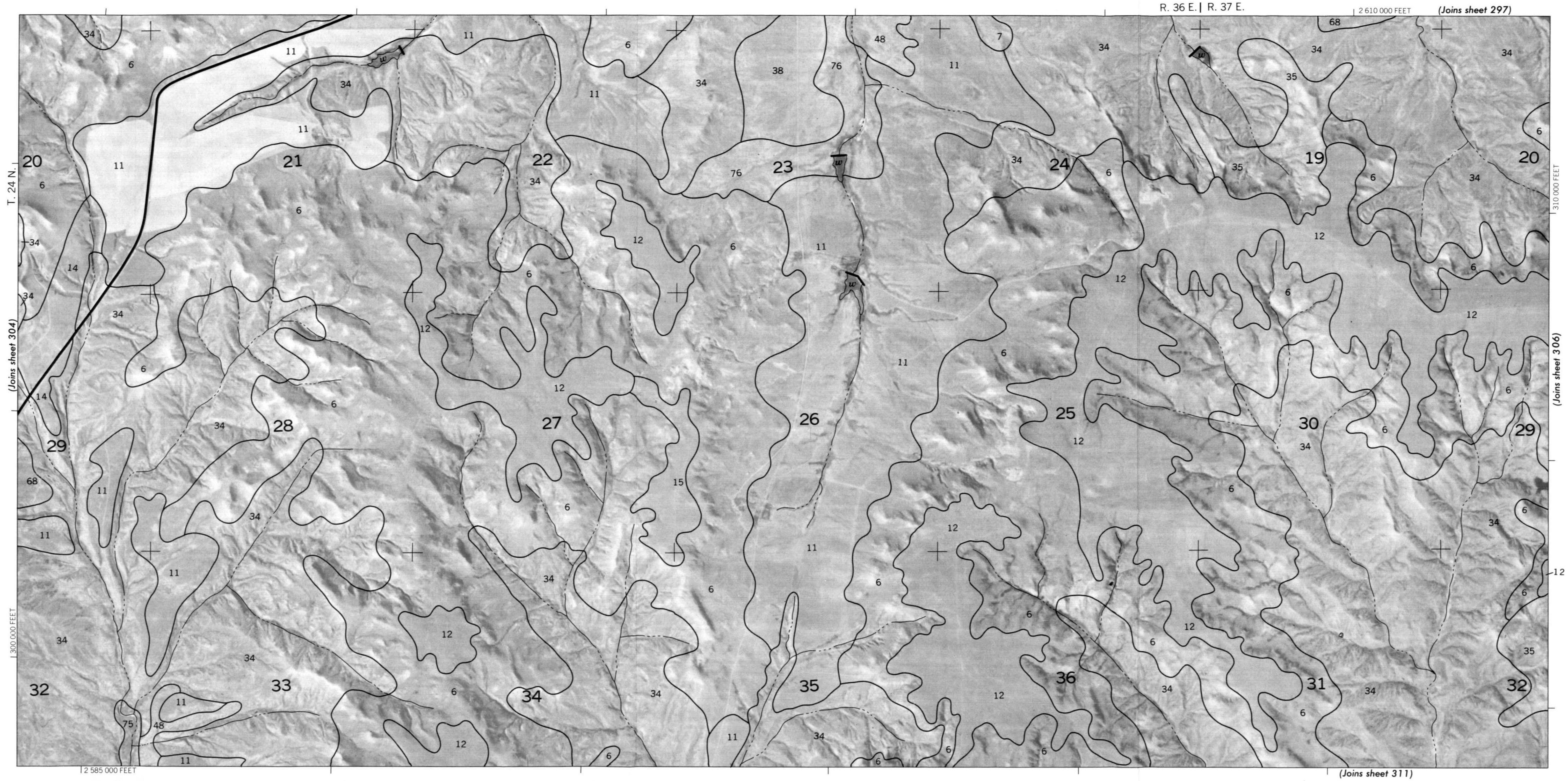
5 000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 304

305

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

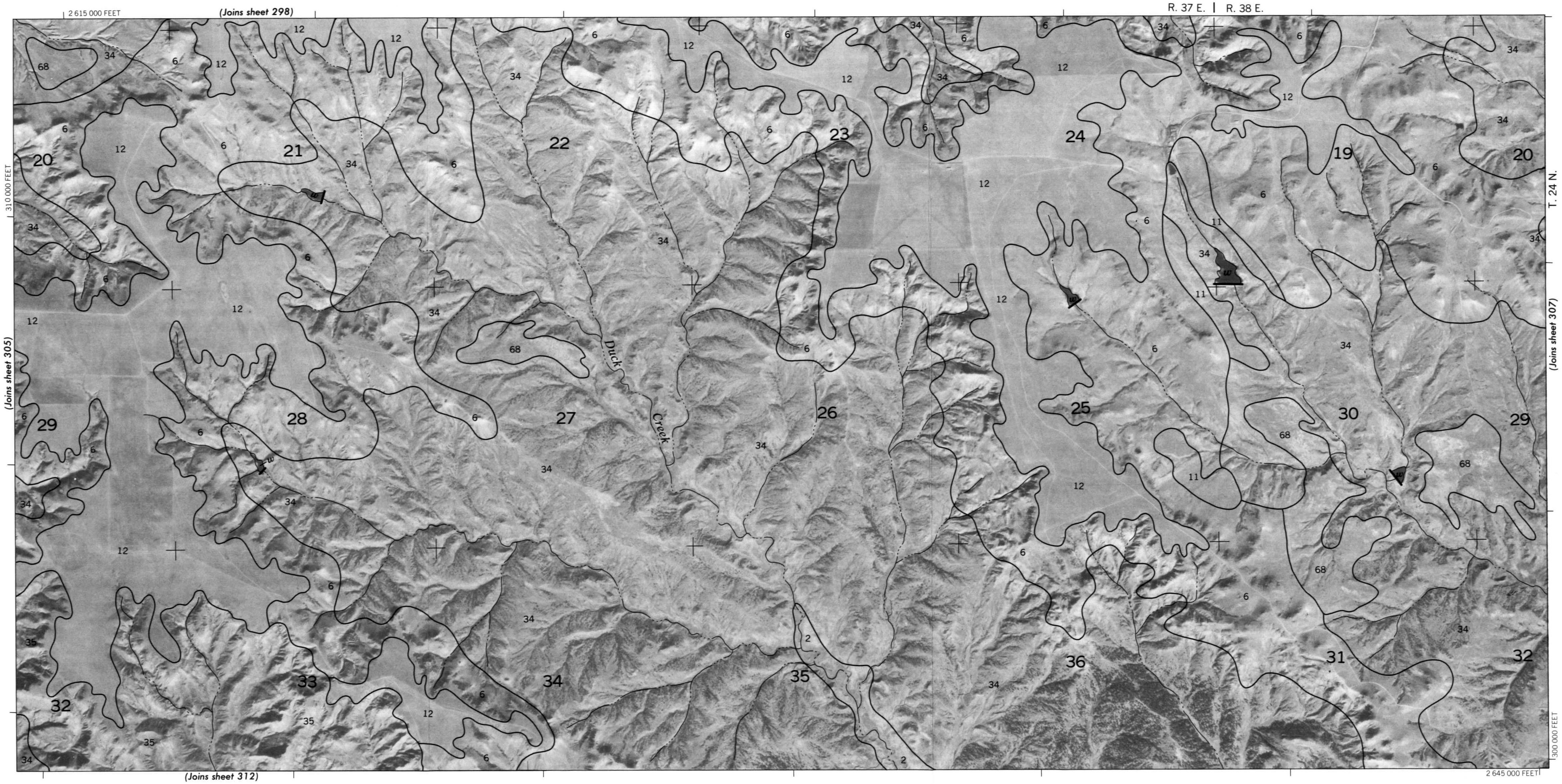
VALLEY COUNTY, MONTANA NO. 305

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

306

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 306



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

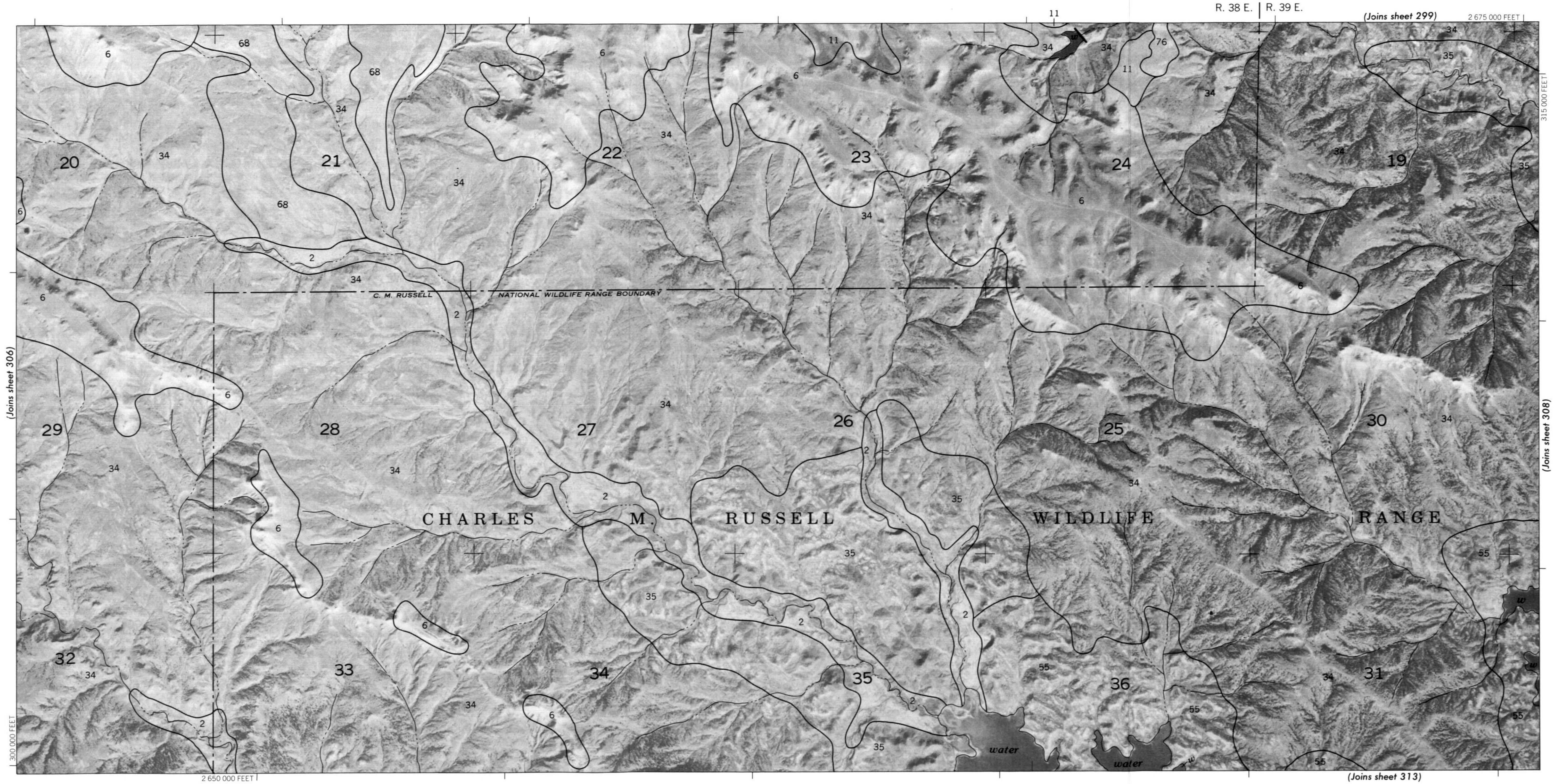
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 306

307

N



1 ¾ ½ ¼ 0 1 2 Miles

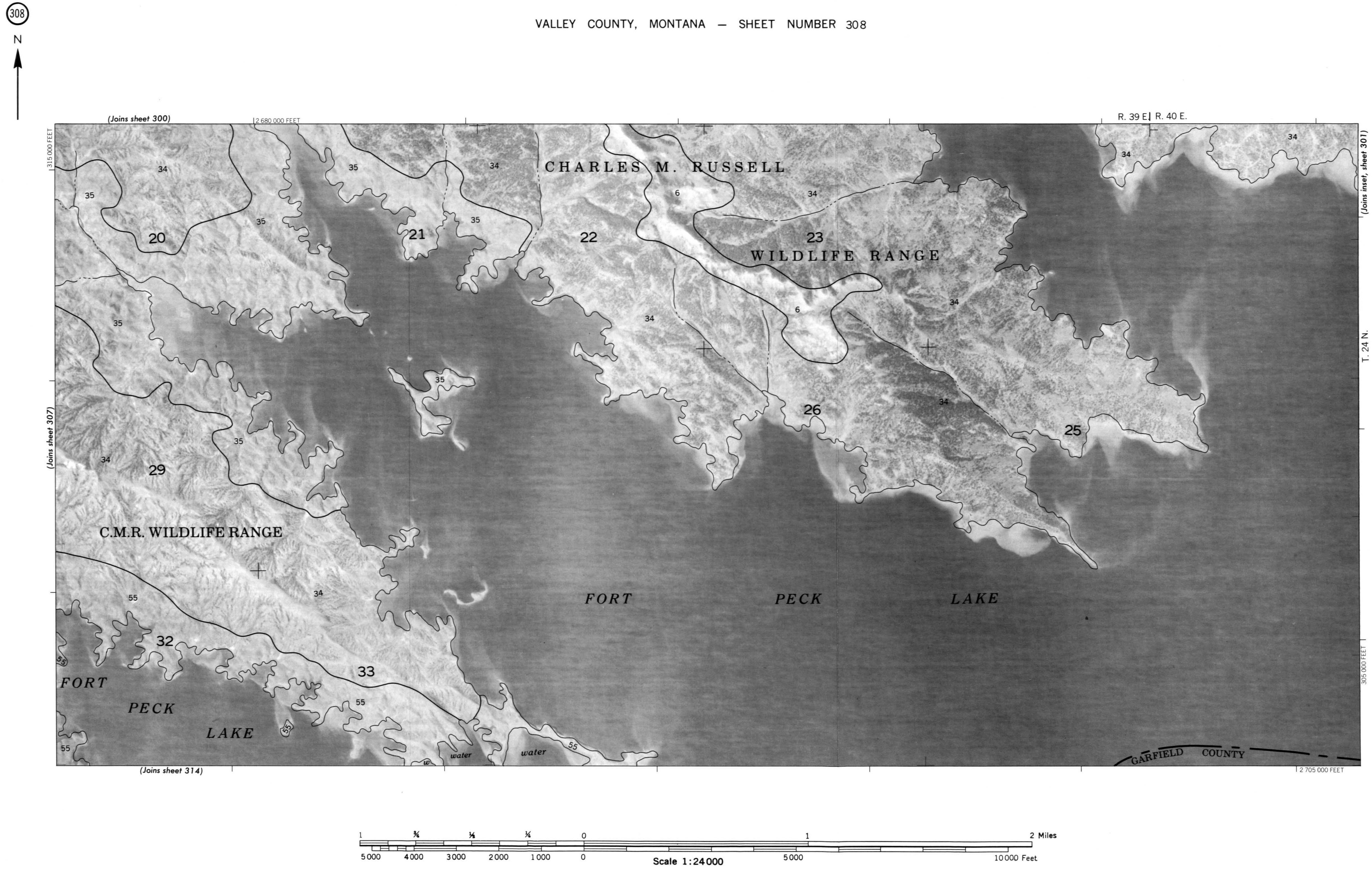
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA NO. 307

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 308

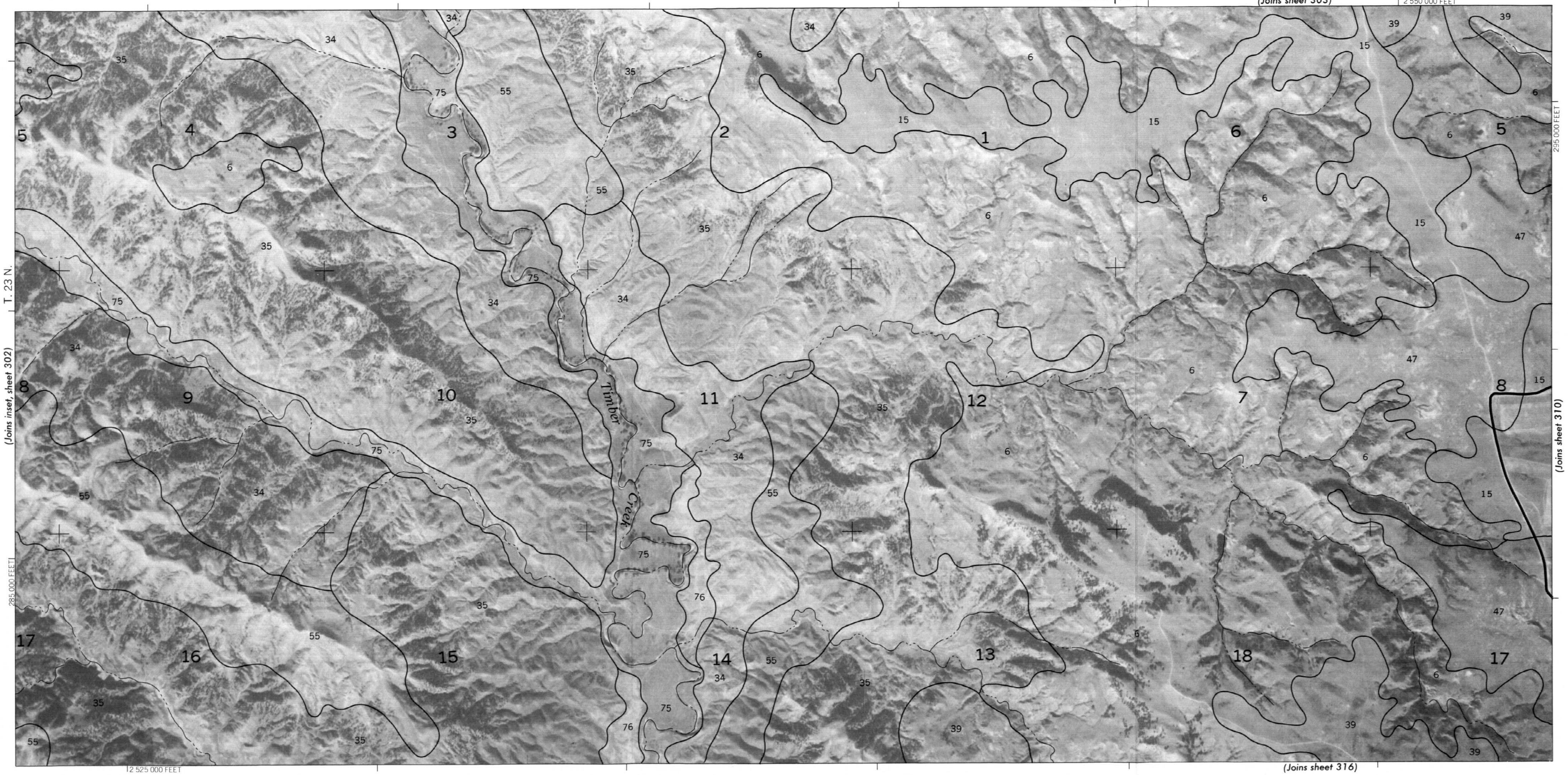


5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA — SHEET NUMBER 309

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

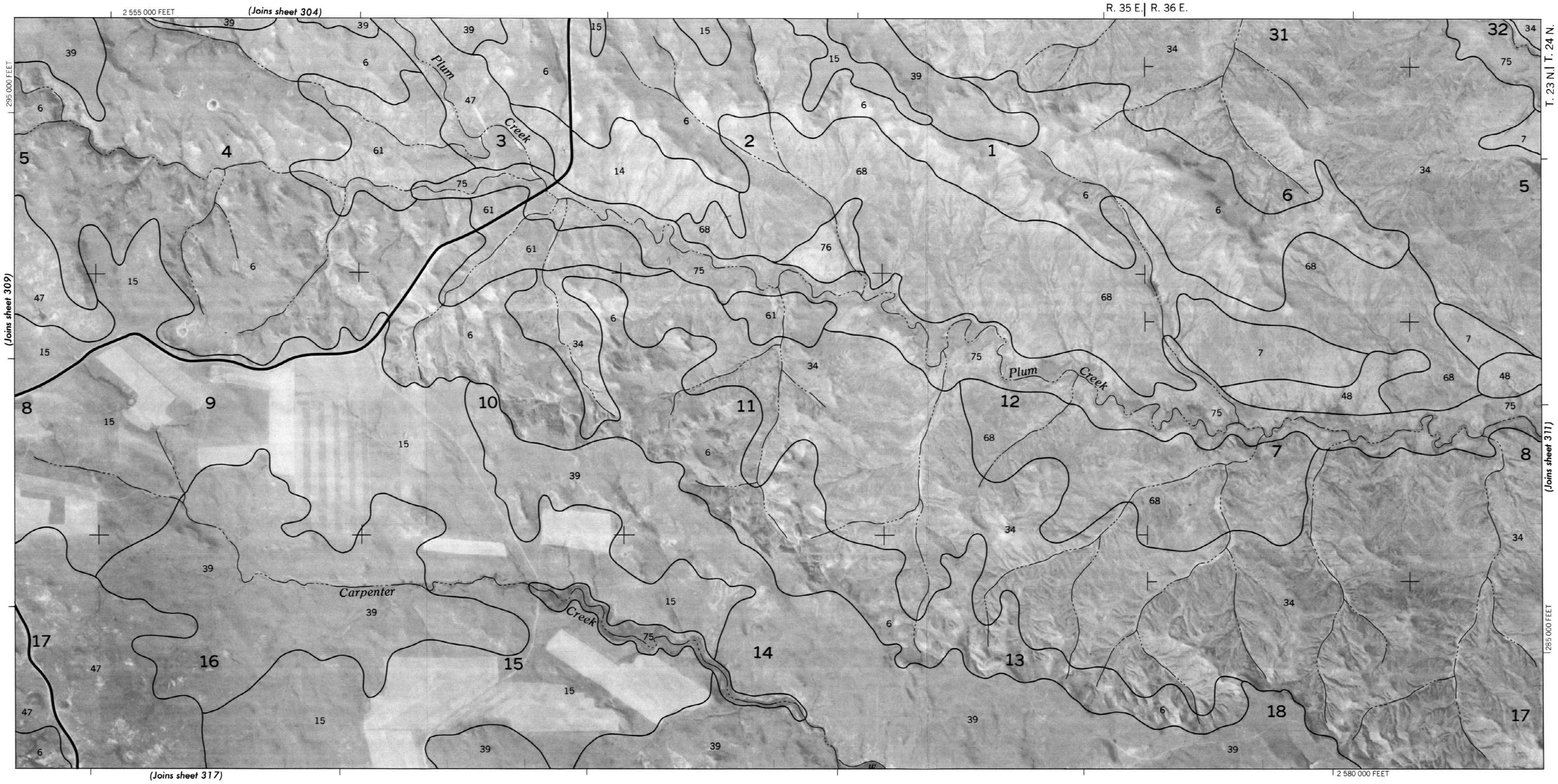
Scale 1:24000

VALLEY COUNTY, MONTANA NO. 309

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5 000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

VALLEY COUNTY, MONTANA — SHEET NUMBER 310

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

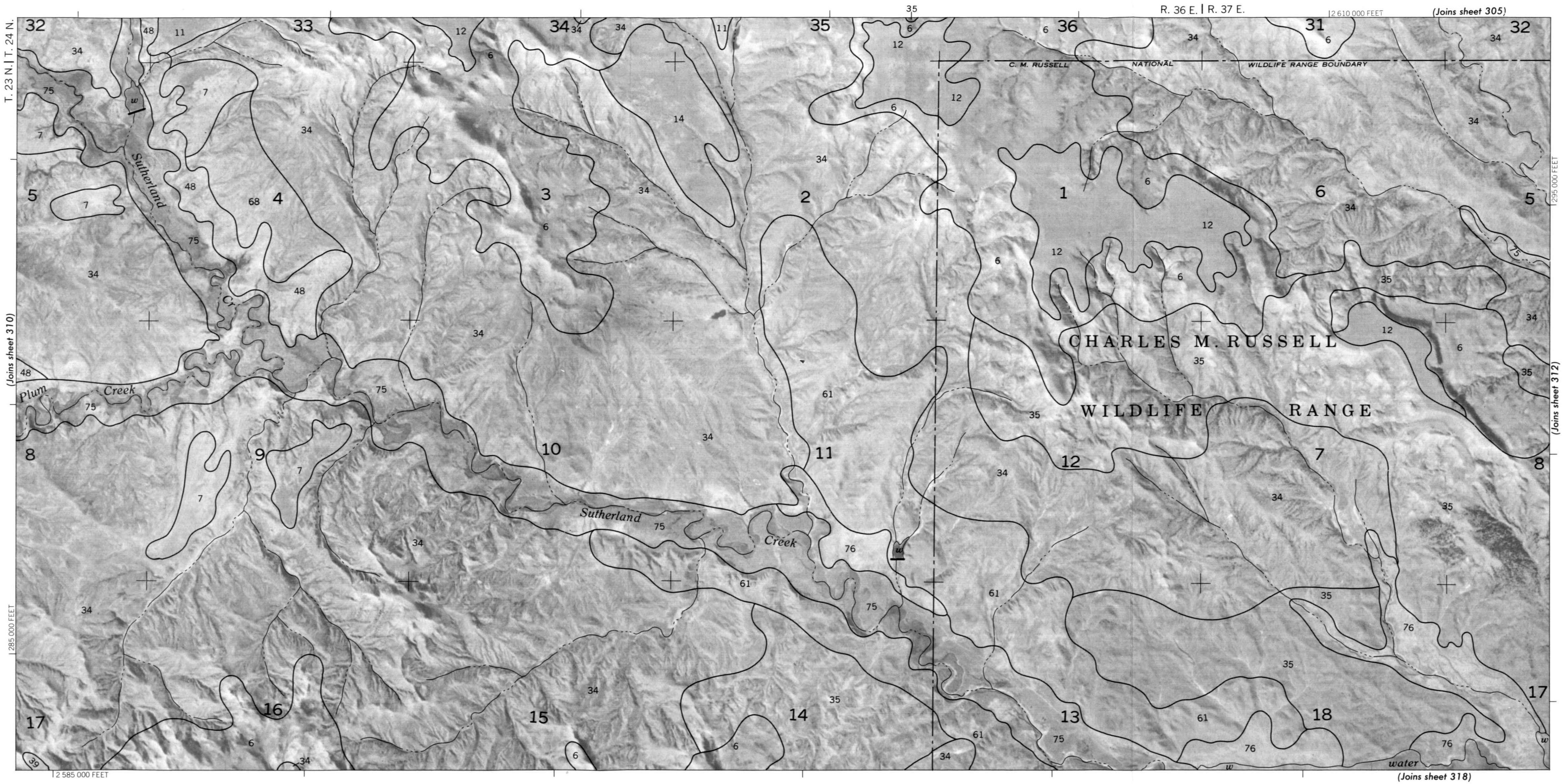
311

N

VALLEY COUNTY, MONTANA NO. 311

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5 000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



1 ¾ ½ ¼ 0 1 2 Miles

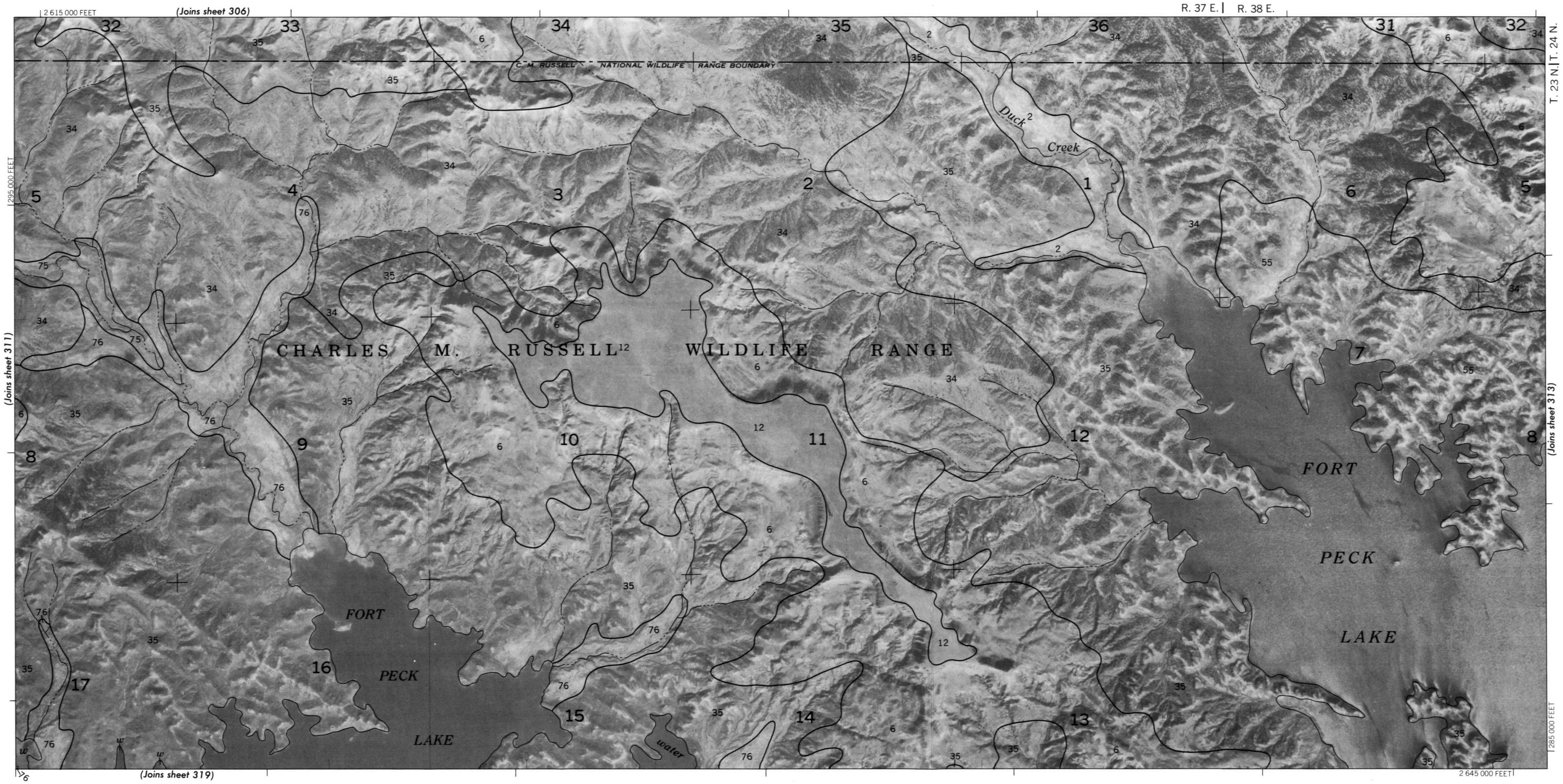
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

(312)

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 312



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24 000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 312

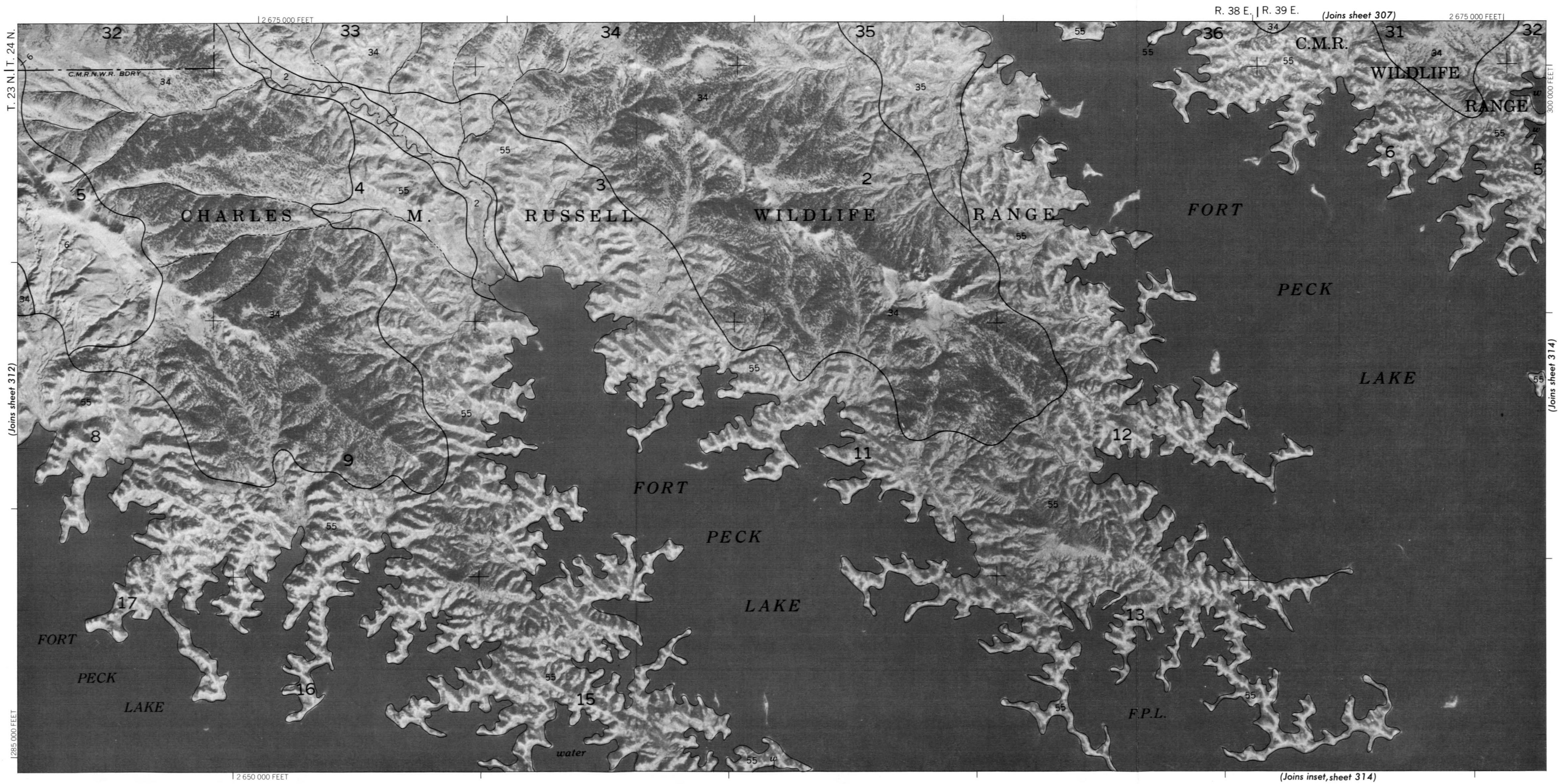
313

N

VALLEY COUNTY, MONTANA NO. 313

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.



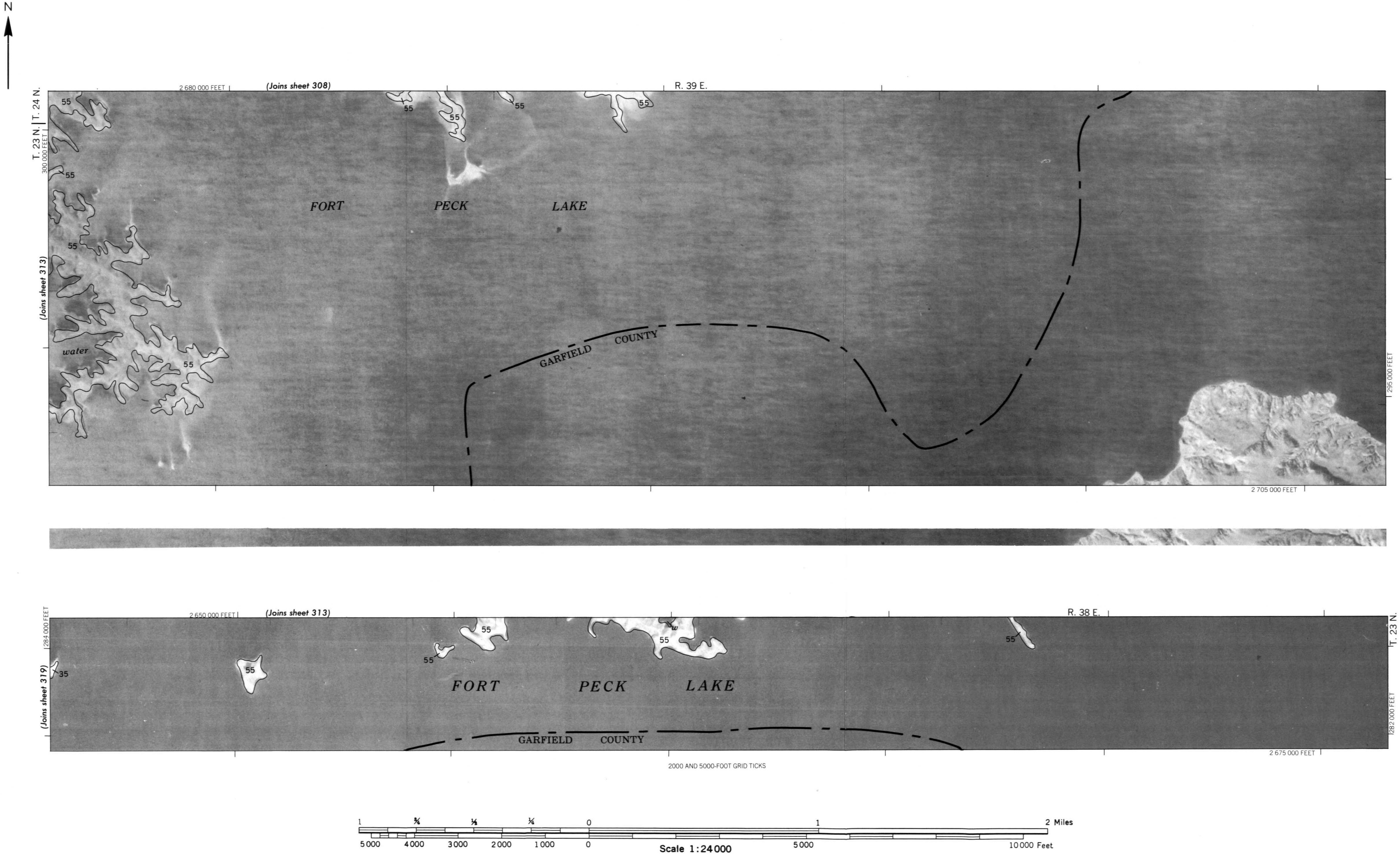
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

(314)

VALLEY COUNTY, MONTANA — SHEET NUMBER 314



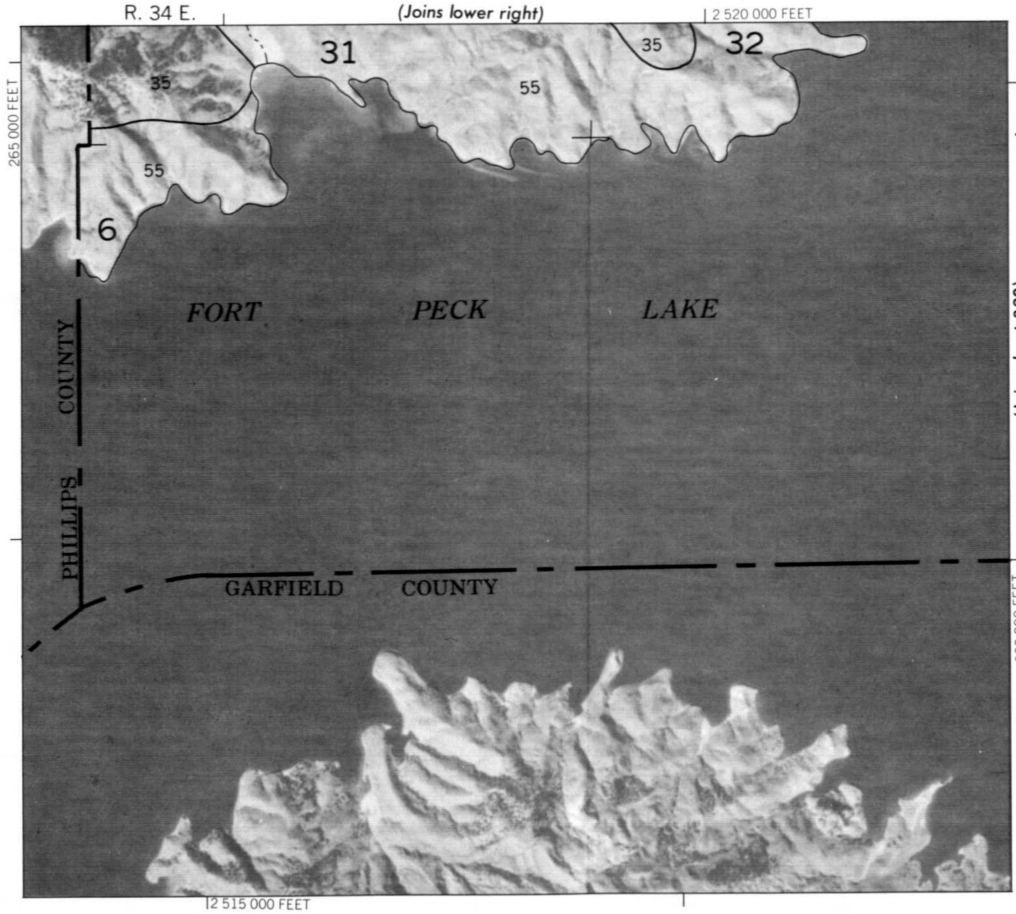
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

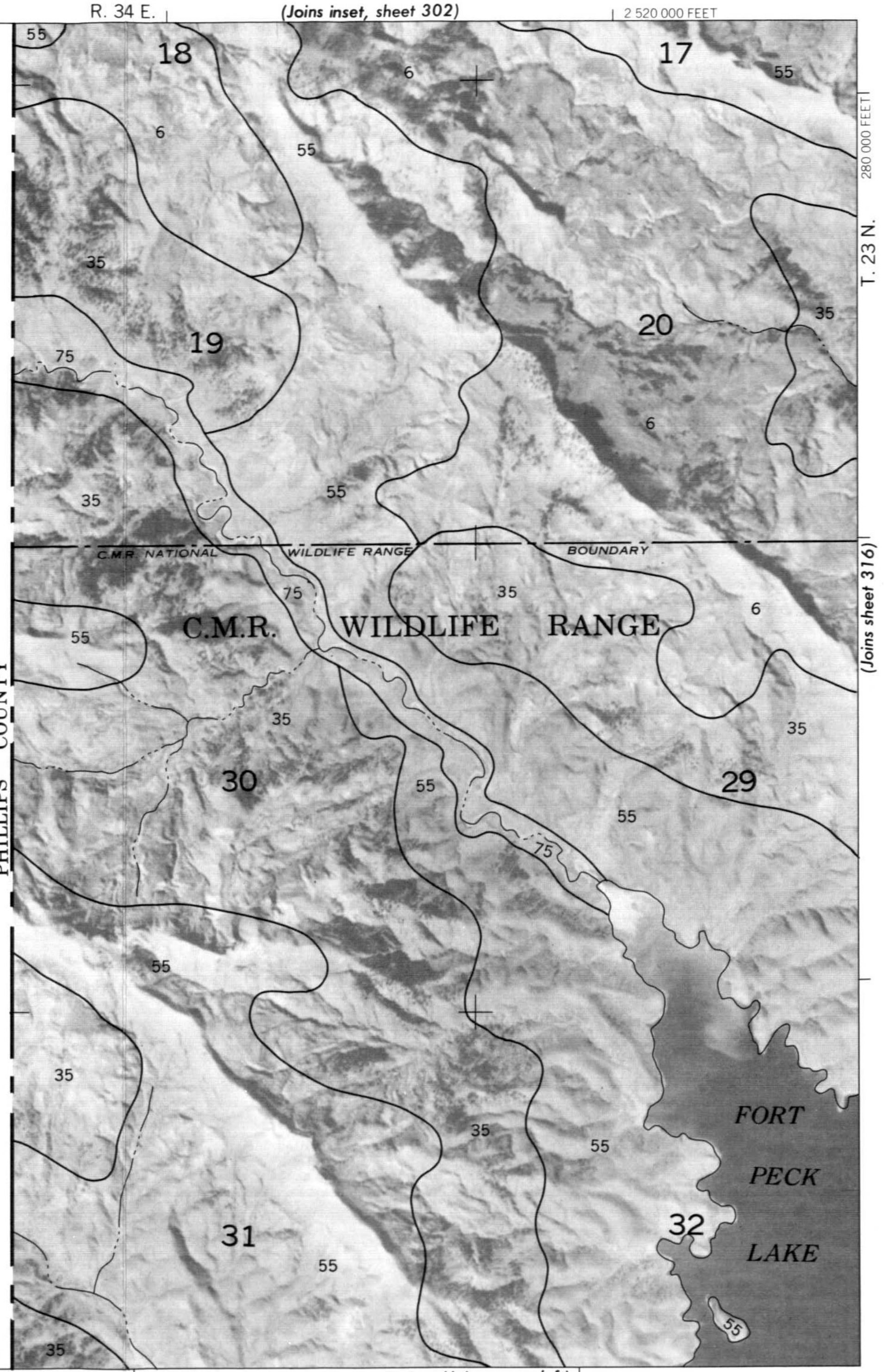
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 314

315

N





265 000 FEET

2 495 000 FEET

VALLEY COUNTY, MONTANA NO. 315

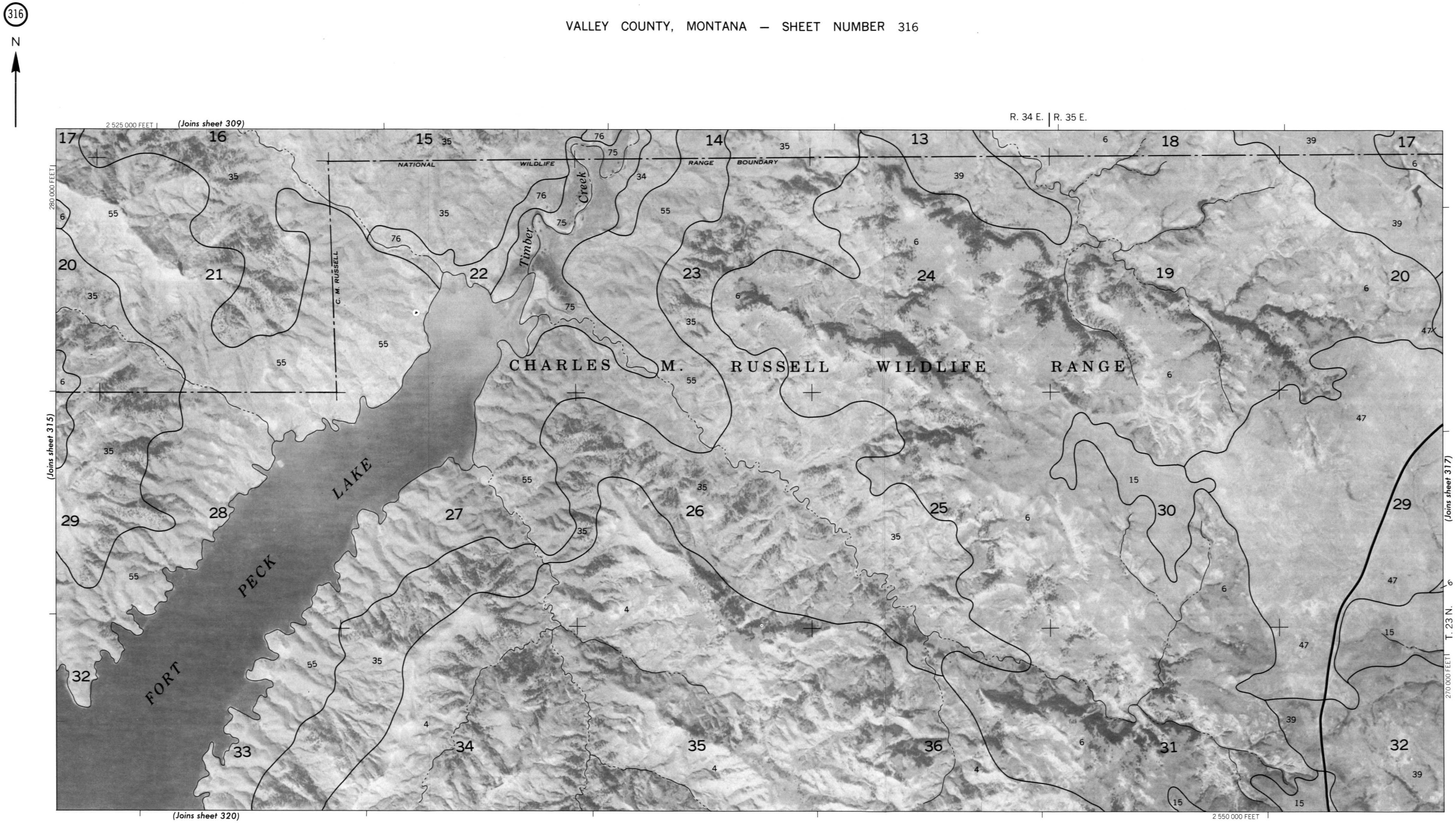
This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

VALLEY COUNTY, MONTANA — SHEET NUMBER 316



Scale 1:24000

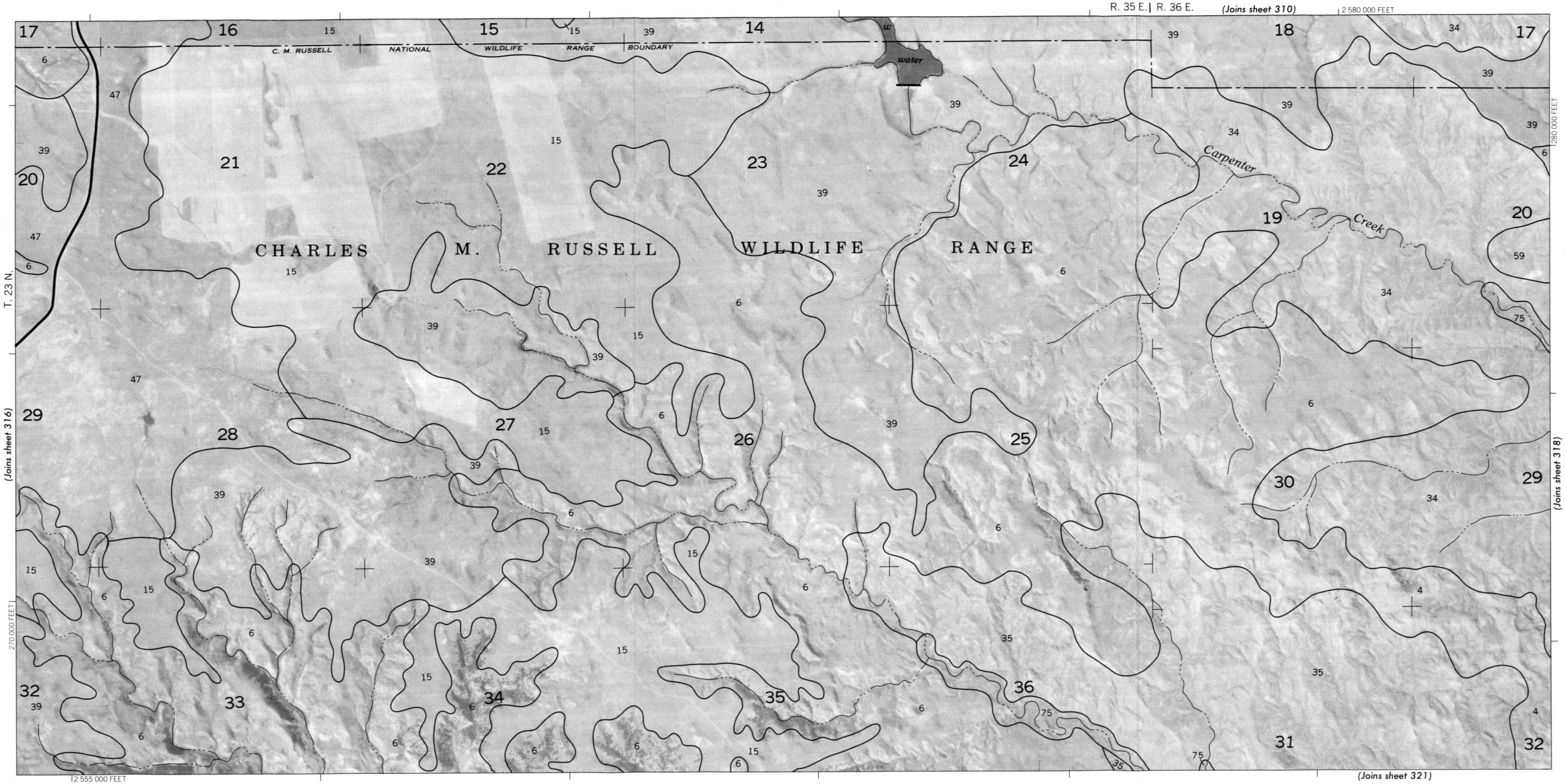
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

N



Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

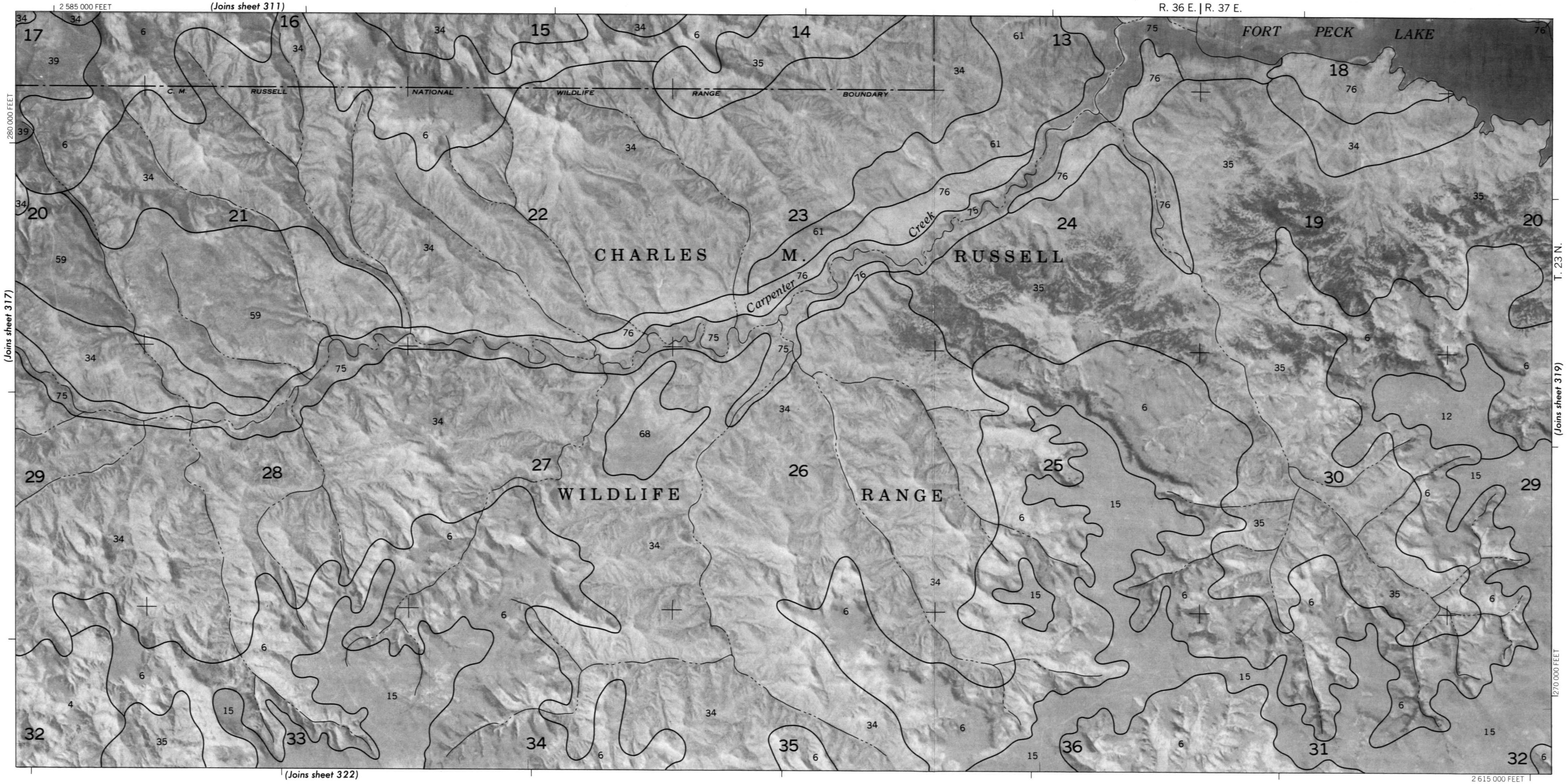
VALLEY COUNTY, MONTANA NO. 317

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

318

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 318



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

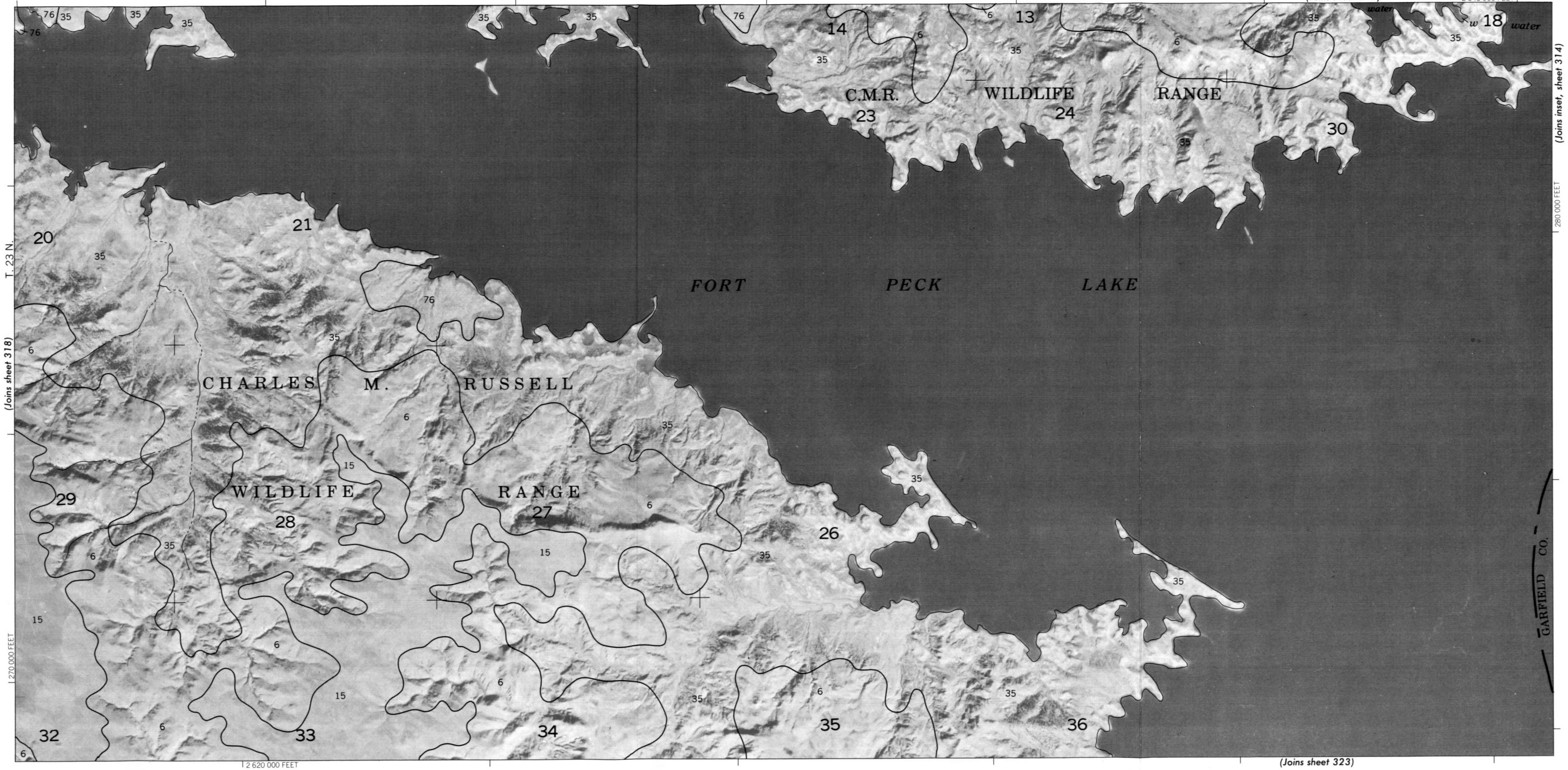
VALLEY COUNTY, MONTANA NO. 318

N

R. 37 E. | R. 38 E.

(Joins sheet 312)

2 645 000 FEET



2 620 000 FEET

(Joins sheet 323)

VALLEY COUNTY, MONTANA NO. 319

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000 foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

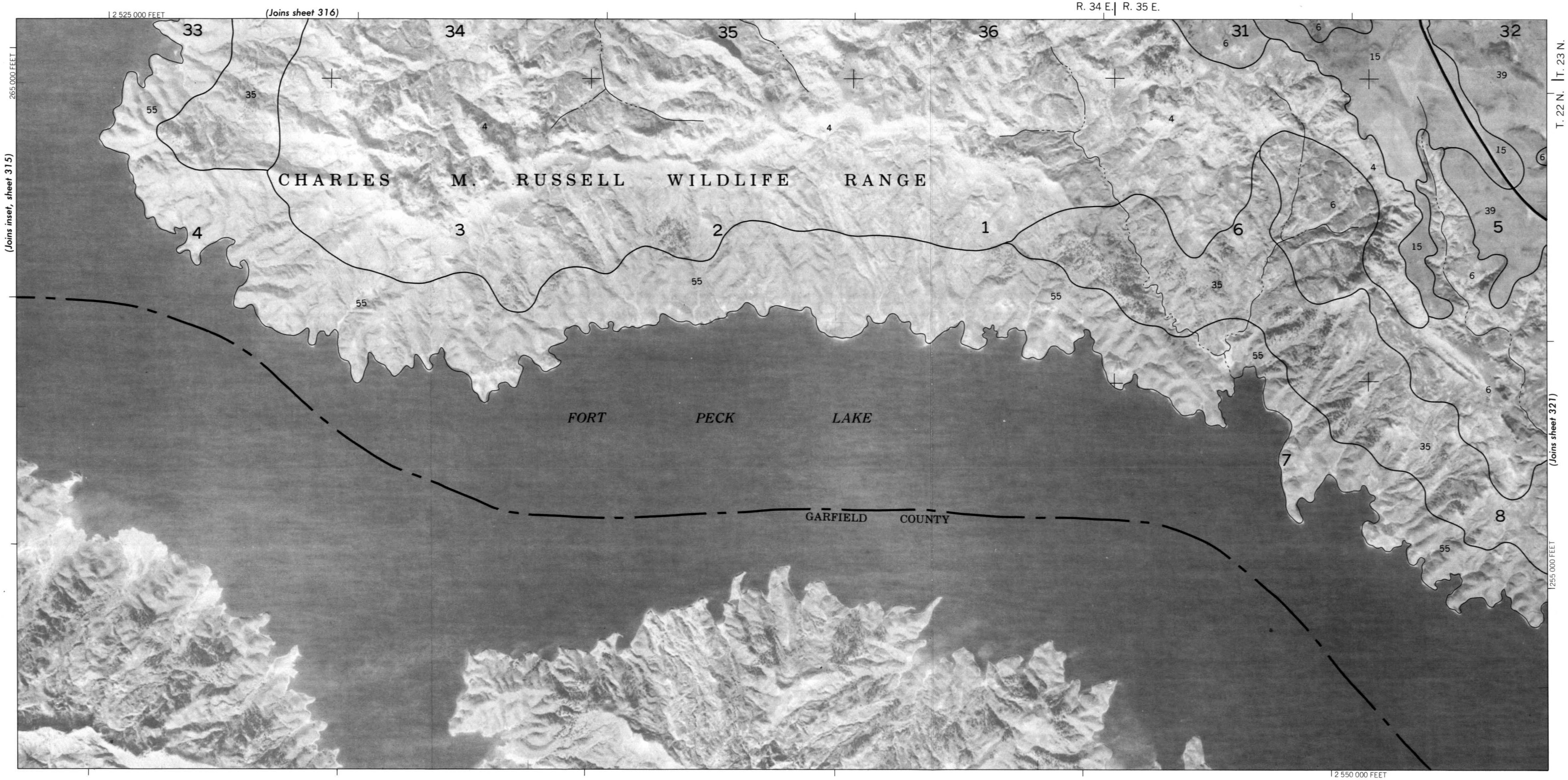
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

VALLEY COUNTY, MONTANA — SHEET NUMBER 320



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

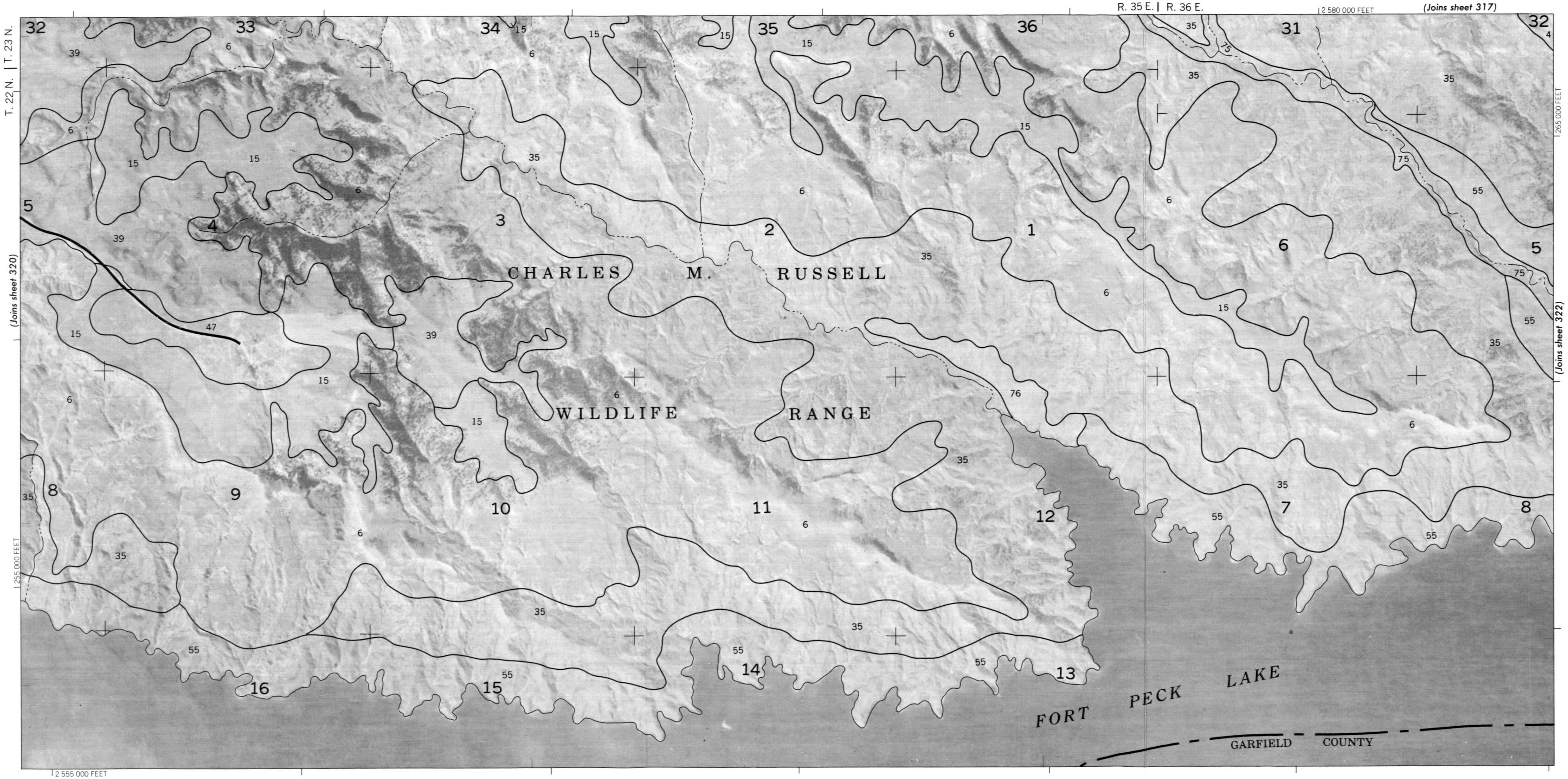
This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

321

N

VALLEY COUNTY, MONTANA NO. 321

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
5 000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned

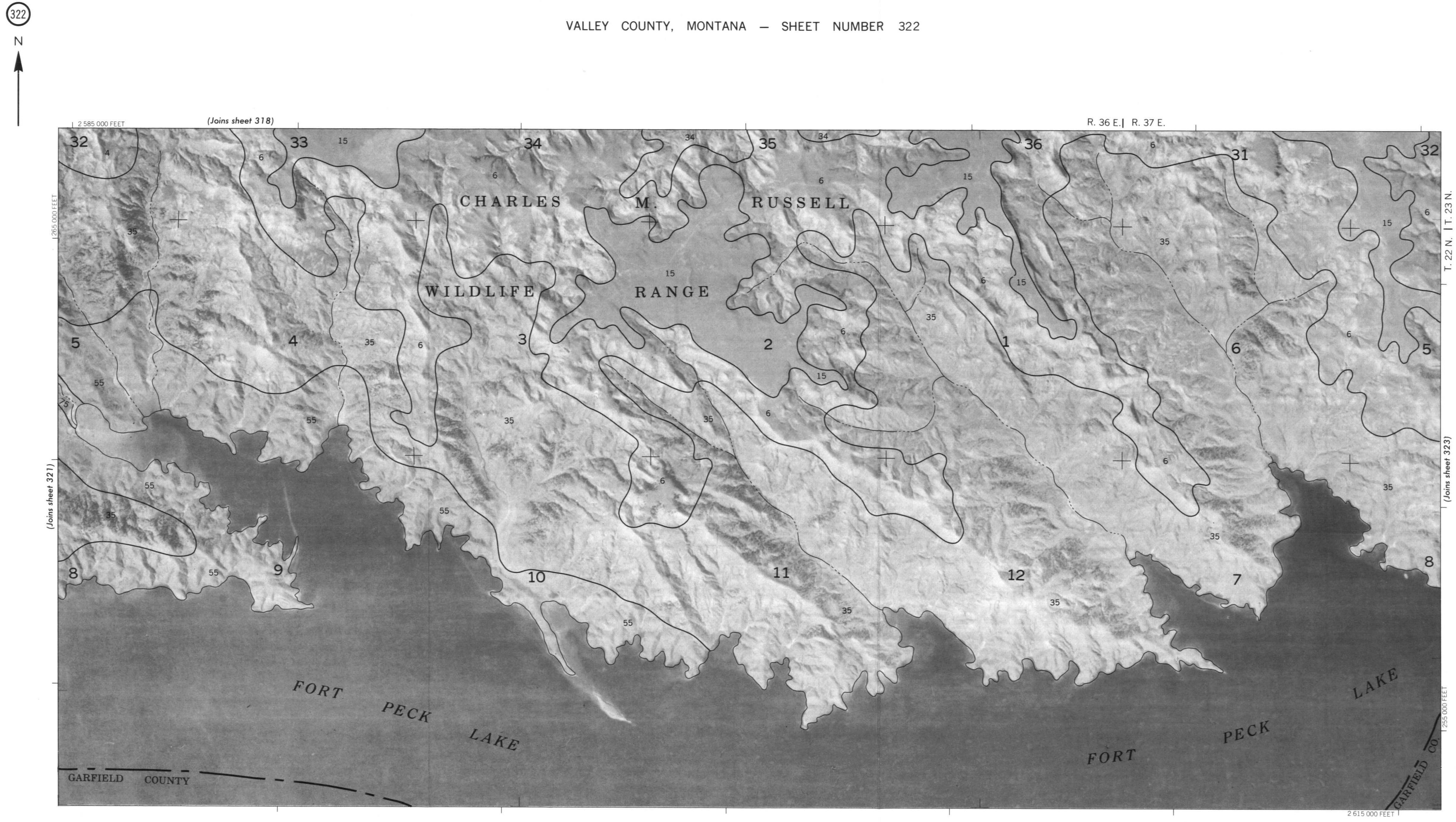


1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

Scale 1:24 000

VALLEY COUNTY, MONTANA — SHEET NUMBER 322



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned.

This map was compiled on 1974, 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.

VALLEY COUNTY, MONTANA NO. 322

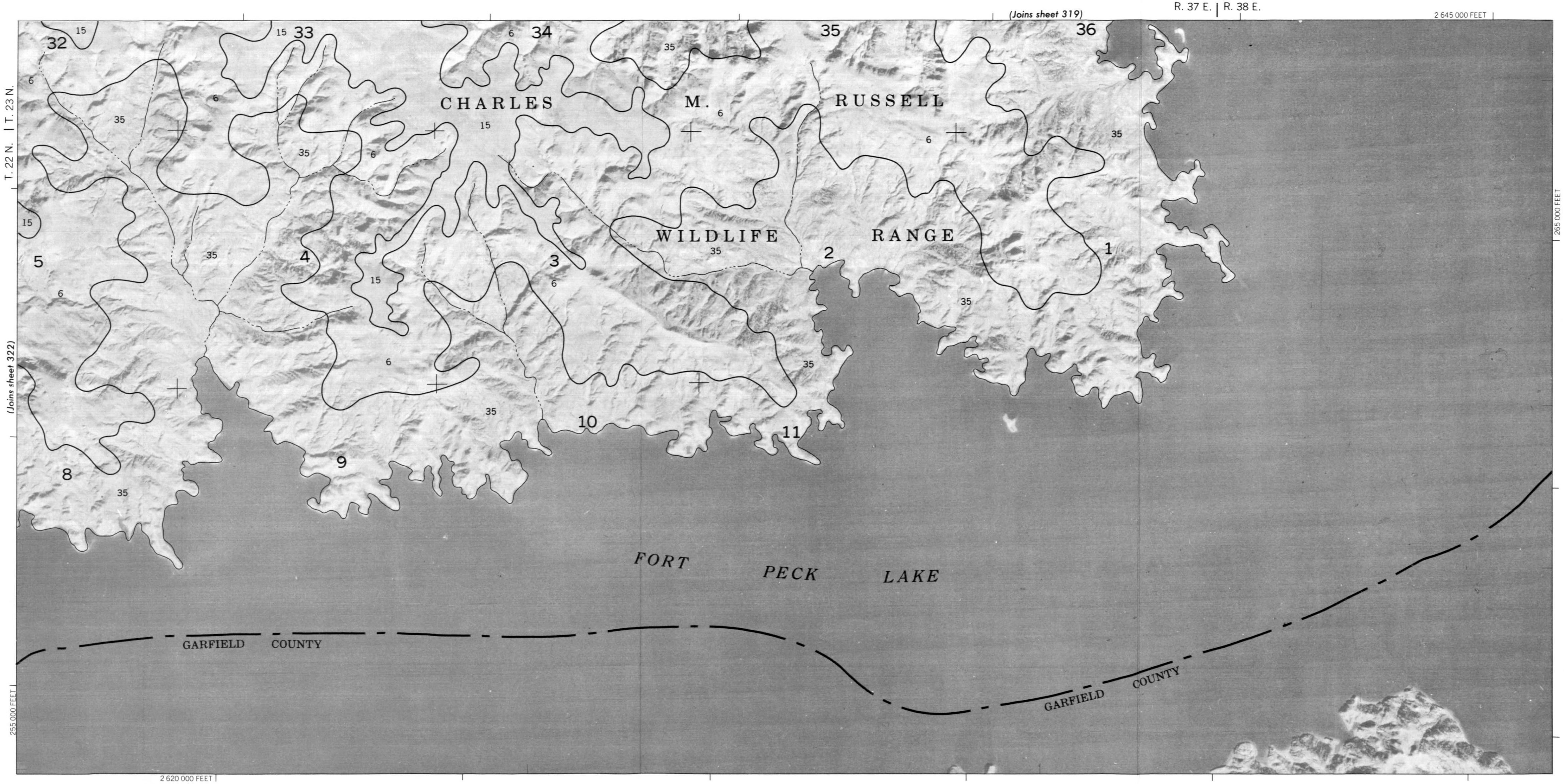
323

N

VALLEY COUNTY, MONTANA NO. 323

This map was compiled on 1974 1975 and 1976 U.S. Department of The Interior, Geological Survey orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies

5,000-foot grid ticks based on state coordinate system. Land division corners, if shown, are approximately positioned



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000